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FASTENERS - SCREWS & RIVETS ON STEEL SHEET SHEAR & BEARING PROPERTIES - DETERMINATION OF

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FASTENERS - SCREWS & RIVETS ON STEEL SHEET

SHEAR & BEARING PROPERTIES - DETERMINATION OF

SUBMITTED UNDER

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REVISIONS

NO.	DATE	BY	CHANGE	PAGES AFFECTED

FASTENERS - SCREWS & RIVETS ON STEEL SHEET

SHEAR & BEARING PROPERTIES - DETERMINATION OF

PURPOSE:

The purpose of this test was to determine the yield and ultimate shear and bearing strengths of AN 509 screws, NAS 177 rivets, and RIV 165* rivets mounted in SAE 4130 and 17-7PH stainless steel sheet.

SUMMARY:

Tests were conducted to determine the effects of sheet thickness on the shear and bearing properties of fasteners. Several sheet thicknesses were tested with each fastener. Fasteners from 3/16" to 1/2 diameter and sheet thicknesses of from .025" to .312" were used in the tests. The sheet materials used were SAE 4130 steel heat treated to 150 ksi and 17-7PH stainless steel in the TH 1050 condition.

The data obtained was tabulated and graphs were drawn showing joint strength versus sheet thickness for each type of fastener tested.

* RIV 165 is the Convair Stock Number for the Hi-Shear Co. Part No. HS67 - Hi-Shear Rivet, 100° Csk Head, 125 ksi shear strength, CRES material.

FASTENERS - SCREWS & RIVETS ON STEEL SHEET

SHEAR & BEARING PROPERTIES - DETERMINATION OF

OBJECT:

The object of this investigation was to determine the yield and ultimate shear and bearing strengths of the following combinations of fasteners and sheet:

1. AN 509 screws, 3/16" to 1/2" in diameter mounted in SAE 4130 steel heat treated to 150 ksi and 17-7PH-TH1050 stainless steel in various gages from .032" to .312".

2. NAS 177 rivets, 1/8" diameter to 3/8" diameter mounted in SAE 4130 steel heat treated to 150 ksi and 17-7PH-TH1050 stainless steel in gages from .025" to .180".

3. RIV 165 rivets, 1/8" to 1/2" diameter mounted in SAE 4130 steel heat treated to 150 ksi and 17-7PH-TH1050 stainless steel in gages of .025" to .312".

DESCRIPTION OF SPECIMENS:

Figure 1 is a sketch of the type specimen used. Exact dimensions of each type specimen were varied to suit the size of the fasteners and the thickness of plates being tested. All specimens were of the general configuration shown and conformed to the requirements listed in Figure 1. The fasteners ranged from 1/8" to 1/2" in diameter. The plates varied from .025" to .312" in thickness. The two e/D ratios were 1.5 and 2.0.

PROCEDURE:

All the material used for the specimens was obtained from in-plant stock. The specimens were fabricated at Convair-FW according to FTJ-7108 and Mil-S-6758, and tested in the Engineering Metallurgy Laboratory.

Testing was done in a Baldwin Lima Hamilton universal test machine of 60,000 lbs. capacity. This machine was calibrated to provide an accuracy in load measurements of 0.2% of scale range or 0.5% of indicated load, which ever was greater. Deformation was measured with a PS5M extensometer.

The manner of affixing the extensometer to the specimen caused considerable concern. At the start of the test, it was fastened directly to the test specimen by means of extension arms. The arms allowed it to be clamped to the centerline of the 2" width specimens. This arrangement had two disadvantages; the magnification obtainable was too high and the extension arms allowed some slippage to occur. The device illustrated in Figure 2 was constructed to overcome these two disadvantages. It was patterned after one developed by High Shear Rivet Tool Company, but was modified somewhat to suit these specimens and to fit into the 60,000 lb. test machine. The magnification of this fixture combined with the extensometer was determined by calibration against two materials of known modulus using 2" wide strips as specimens. The results obtained from these two materials agreed within 1.5%. The balance of the test specimens, approximately 95% of the specimens, were then tested using this fixture.

The yield point was taken from the autographic curves at a permanent offset of 2 1/2% of the shank diameter of the fastener being tested. The method of taking the yield strength is shown graphically in Figure 3. To obtain the yield strength, the specimens were loaded to near an estimated yield point, and then unloaded to a low stress level. Loading was then resumed and continued to failure. This reloading caused a second curve to be traced. The reason for this procedure was that the first curve was influenced by the unavoidable play between the fasteners and the holes in the plates. The play was taken up by the load applied during the first part of the cycle. The second curve was therefore assumed to be the true curve and the yield was taken from it.

Failures were classified in three general types. Where the failure occurred by pulling the heads of the fasteners through the plates, or by pulling the fasteners through the ends of the plates, it was classed as a bearing failure. If the plates failed at some other point, such as near the grip ends, it was called a tensile failure. If the fasteners were sheared the failure was called a shear failure.

RESULTS:

The results of this investigation consist entirely of empirical data presented as follows:

Tables I thru VI - Yield & ultimate strength in tabular form.
Figures 5 thru 27 - Yield & ultimate strength versus plate thickness in graphical form.

DISCUSSION:

During the period in which these data were obtained, portions of the original test request were cancelled and some of the test specimens, or their identifications, were lost. Therefore, some of the possible joint configurations which were part of the original test request and which are indicated as part of this test under the heading "Object" were not tested.

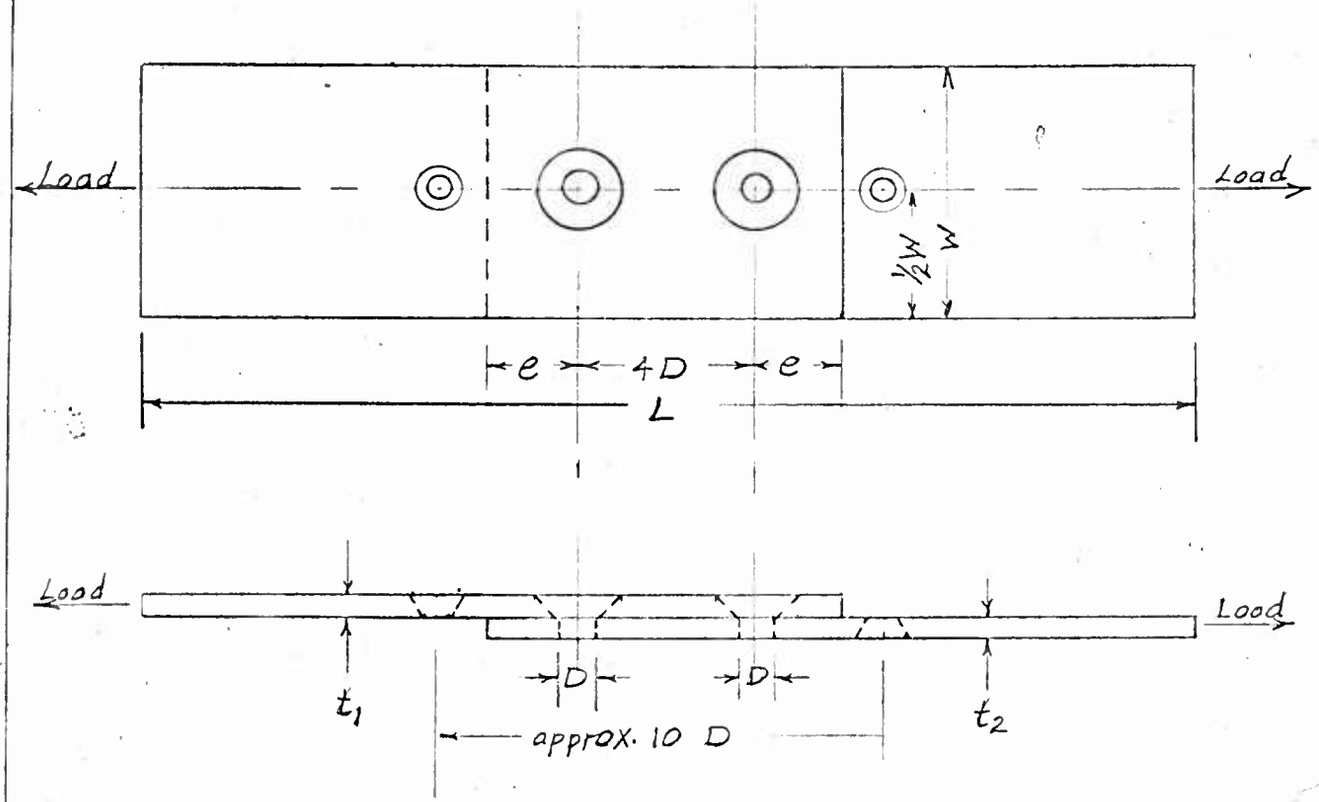
In testing specimens of the geometry used in this test, some scatter in the data is to be expected. Actually, the test results in general showed less scatter than was anticipated.

Where scatter did occur in the yield strength values, it is felt that there were three contributing factors. The first was normal manufacturing tolerances. Although these tolerances were small, they created the possibility for one fastener to be loaded before the other. Another factor which may have effected some of the results was that many of the fasteners were considerably longer than the specification called for. In these cases, the excessive grip length was taken up with washers. On these specimens, the fastener tilted at high loads. This probably resulted in an unrealistic load distribution in the fastener and plates. The correct length fasteners were reportedly unavailable at the time the specimens were fabricated.

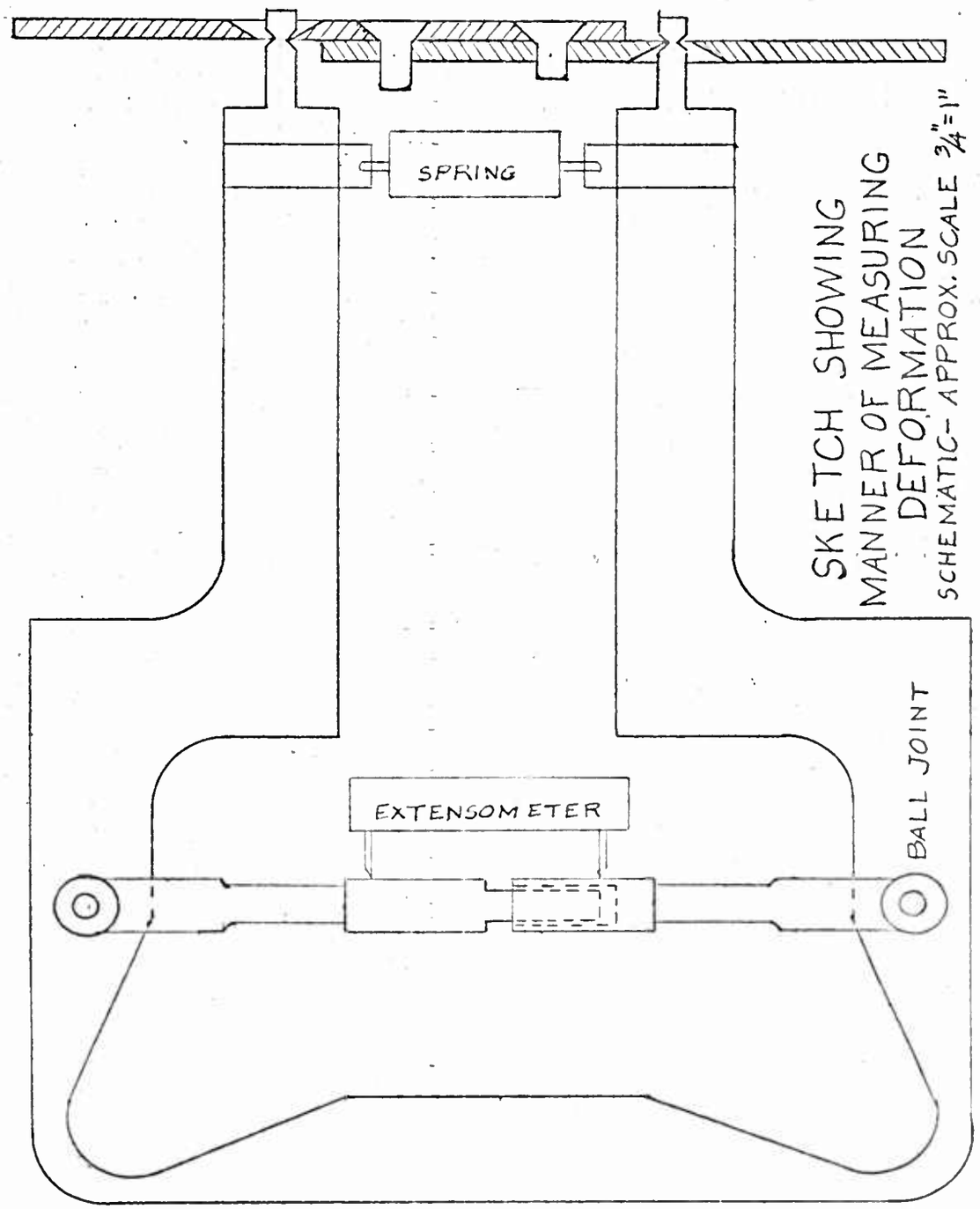
The curve shown in Figure 3 is an idealized one. Many of the actual curves were far more difficult to interpret. Small differences in selection of point "A" had no serious affect on the yield point determinations because the 2-1/2% permanent set was measured from point "O". The difficulties occurred in determining the slope of line MN. In many cases, there was no straight part of the curve at section CA, making it difficult to determine a slope for line MN.

CONCLUSIONS:

Since the object of this investigation was to ascertain the empirical data which was present in the Tables, no conclusions were drawn.



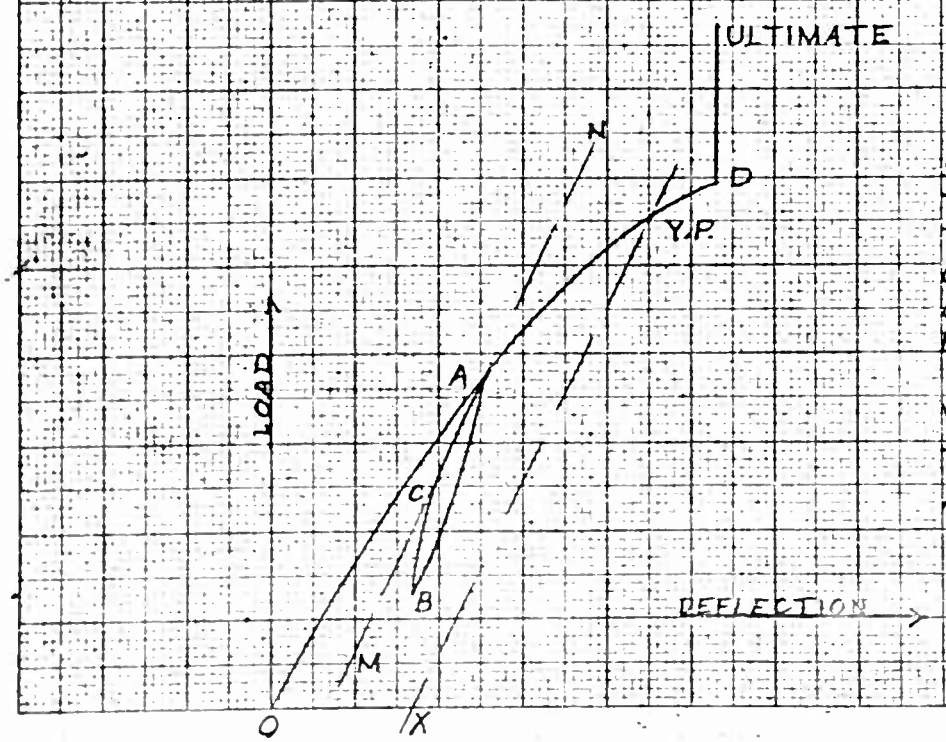
W = 2" or 8 D whichever is less
$t_1 = t_2$. e = 2 D or 1.5 D
L = 7" to 8" depending upon D
Fig. 1: TYPICAL TEST SPECIMEN



SKETCH SHOWING MANNER OF MEASURING DEFORMATION
SCHEMATIC- APPROX. SCALE 3/4"=1"

FIG. 2.

FIG. 3. TYPICAL LOAD DEFLECTION CURVE



SPECIMENS WERE LOADED TO POINT "A" THEN THE LOAD WAS DECREASED SLOWLY TO POINT "B". LOADING WAS RESUMED AND CONTINUED TO FAILURE. THE EXTENSOMETER WAS REMOVED AT "D". LINE MN WAS DRAWN TANGENT TO THE STRAIGHT PART OF CURVE "C-A", OX WAS SET OFF EQUAL TO 2.5 % OF THE DIAMETER OF THE FASTENERS, X-YR WAS DRAWN PARALLEL TO MN.

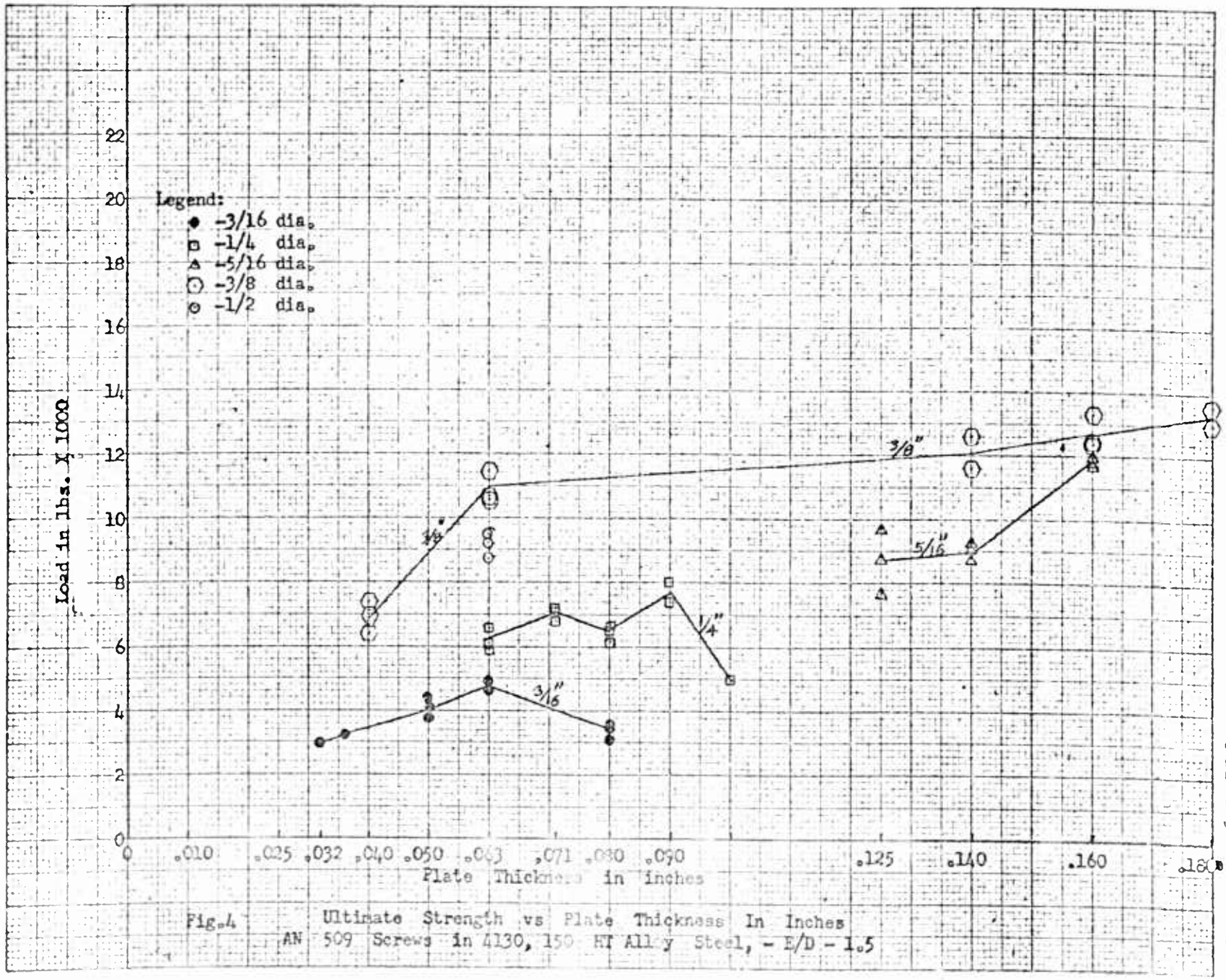


Fig.4 Ultimate Strength vs Plate Thickness In Inches
AN 509 Screws in 4130, 150 HT Alloy Steel, - E/D - 1.5

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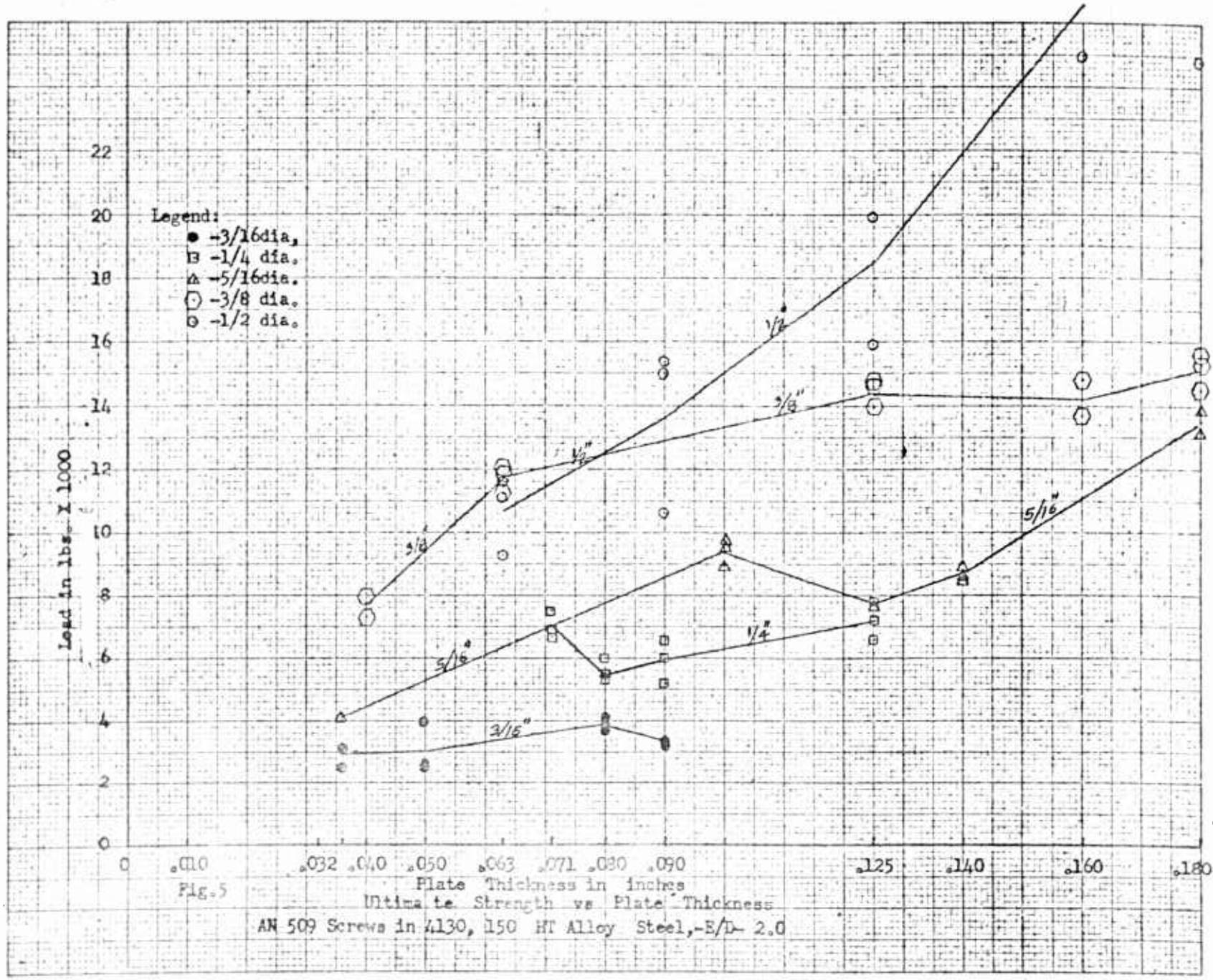

Plate Thickness in inches

Fig.5

Ultimate Strength vs Plate Thickness

AN 509 Screws in 4130, 150 HT Alloy Steel,-E/D- 2.0

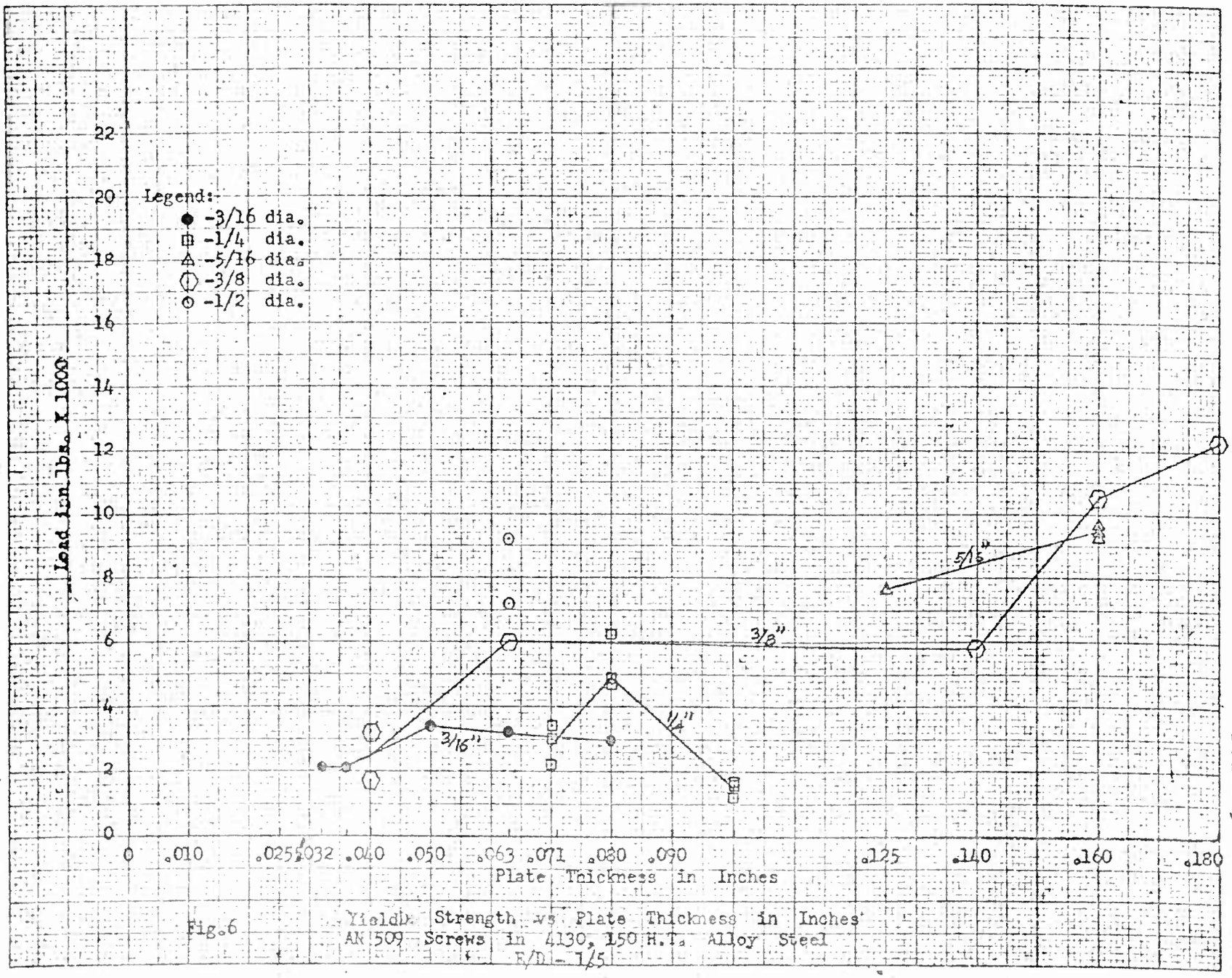

Fig.6 Yield Strength vs Plate Thickness in Inches
AN 509 Screws in 4130, 150 H.T. Alloy Steel
E/D = 1/5

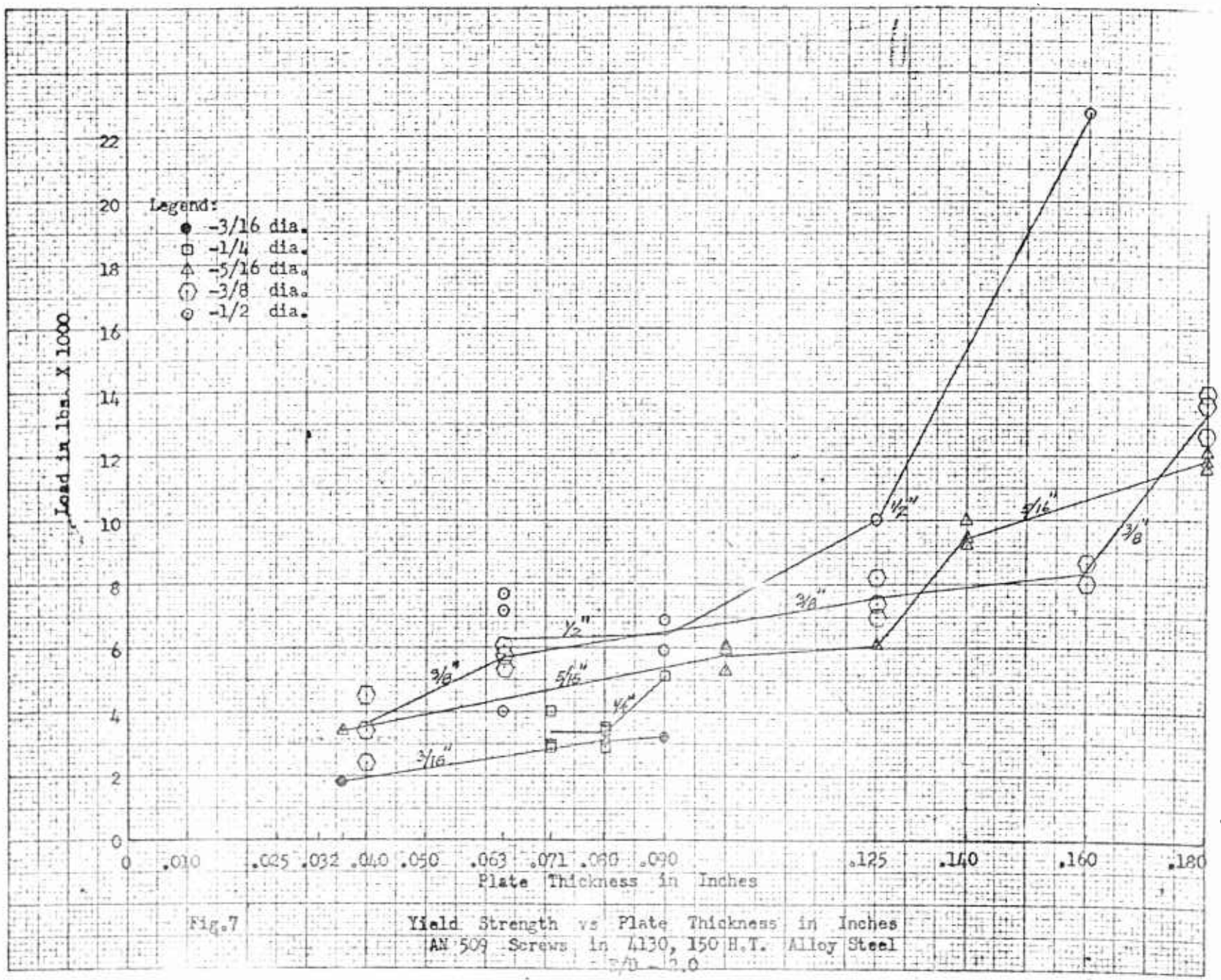

Fig.7 Yield Strength vs Plate Thickness in Inches
AN 509 Screws in 4130, 150 H.T. Alloy Steel
S/D = 2.0

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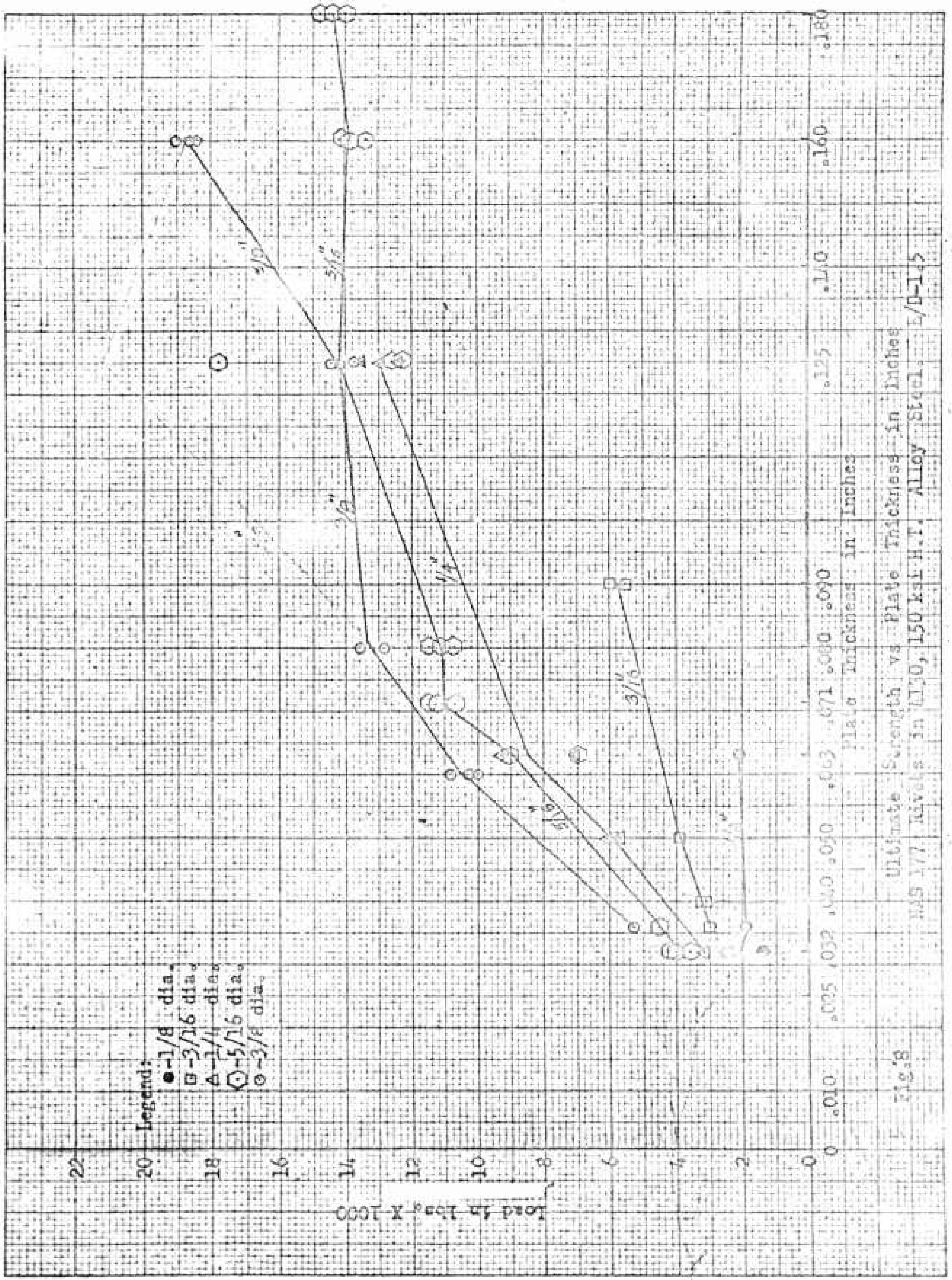

Fig. 8 Ultimate Strength vs Plate Thickness in Inches
NAS 177 Rivets in 1130, 150 ksi H.T. Alloy Steel. E/D=1.5

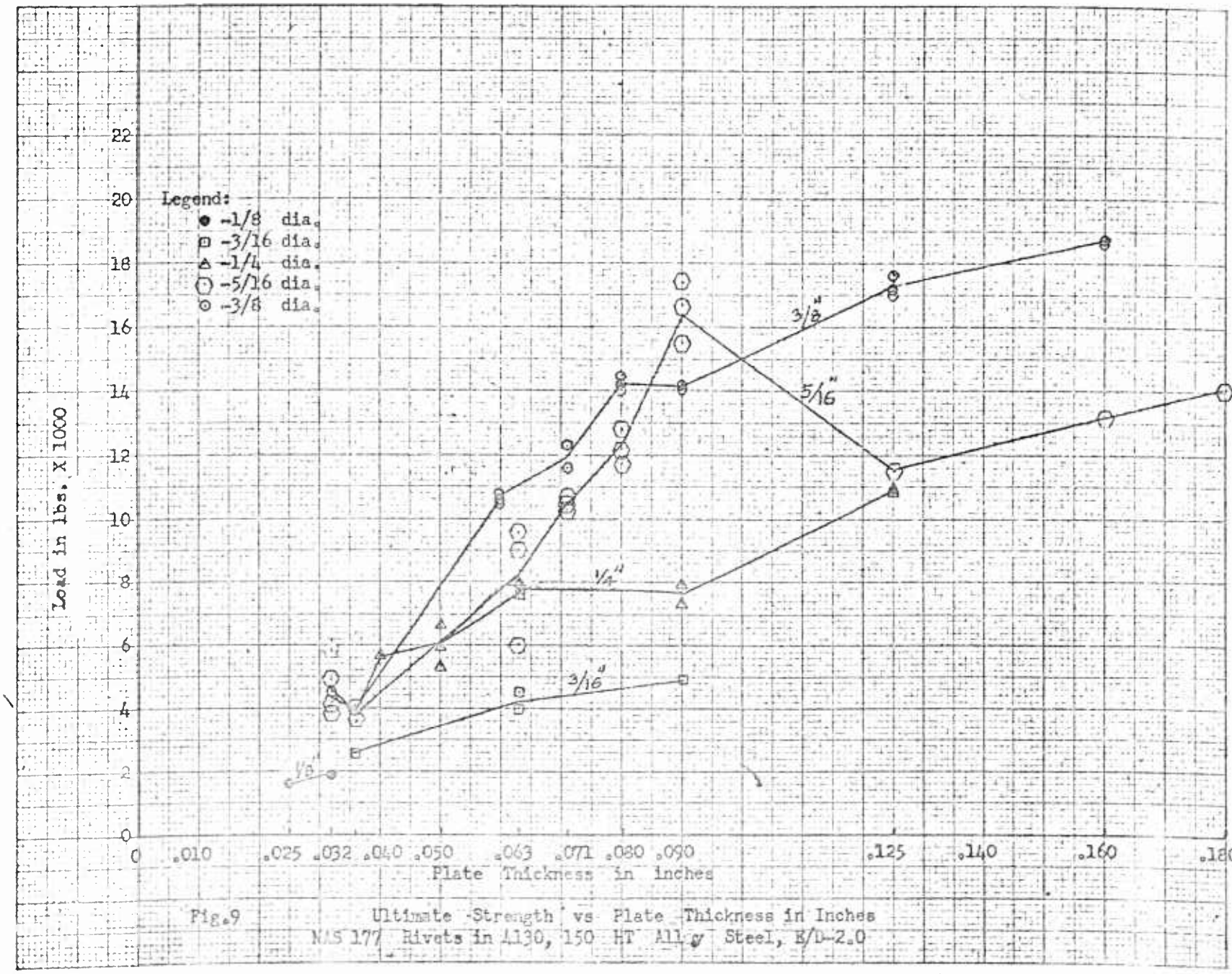

Fig.9 Ultimate Strength vs Plate Thickness in Inches
NAS 177 Rivets in 4130, 150 HT Alloy Steel, E/D-2.0

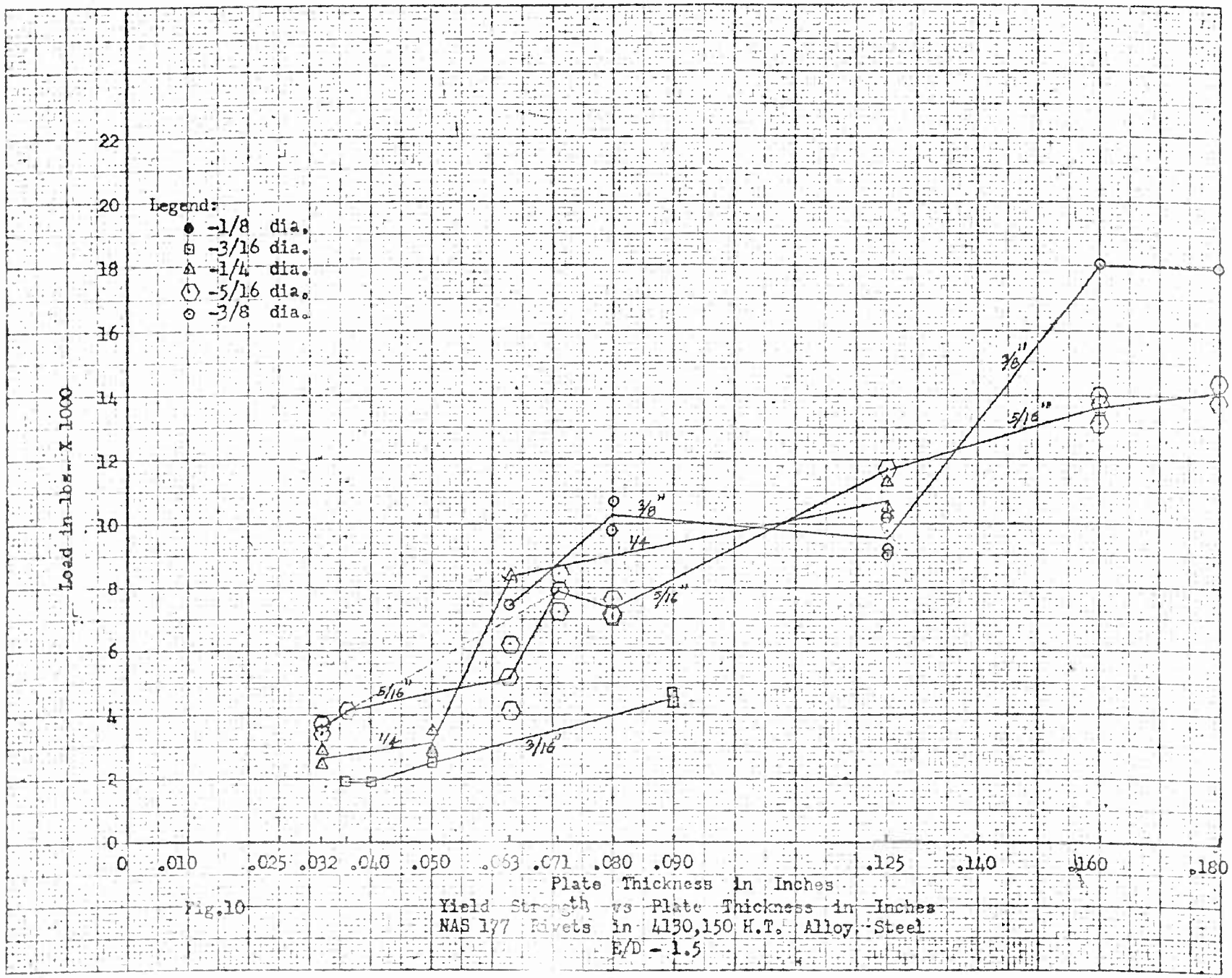

Fig.10 Yield Strength vs Plate Thickness in Inches
NAS 177 Rivets in 4130,150 H.T. Alloy Steel
E/D - 1.5

K+E 10 X 10 TO THE ½ INCH 359-12
KEUFFEL & ESSER CO.

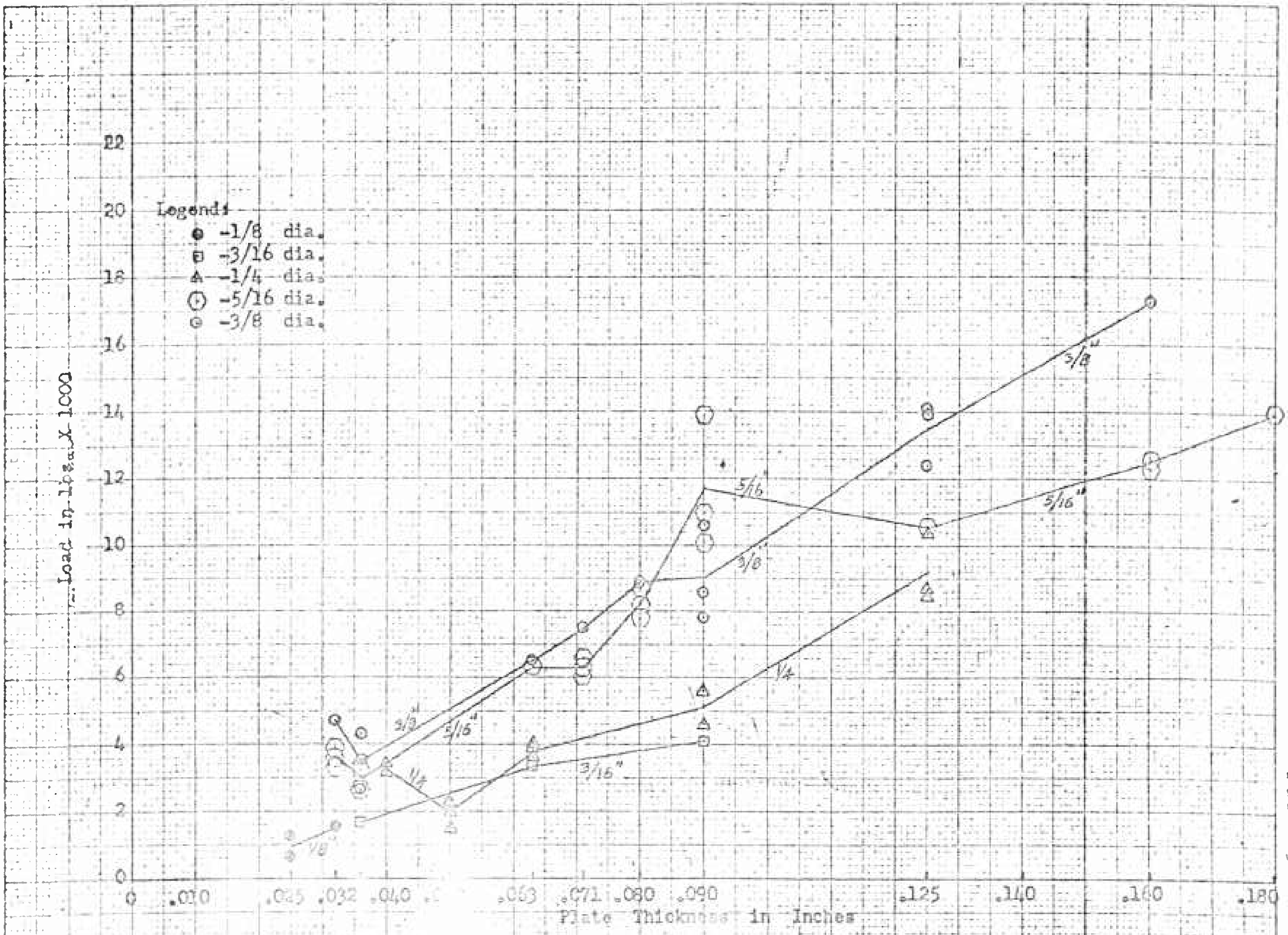

Fig. 11 Strength vs Plate Thickness in Inches
in 160 H.T. Alloy Steel
E/D -

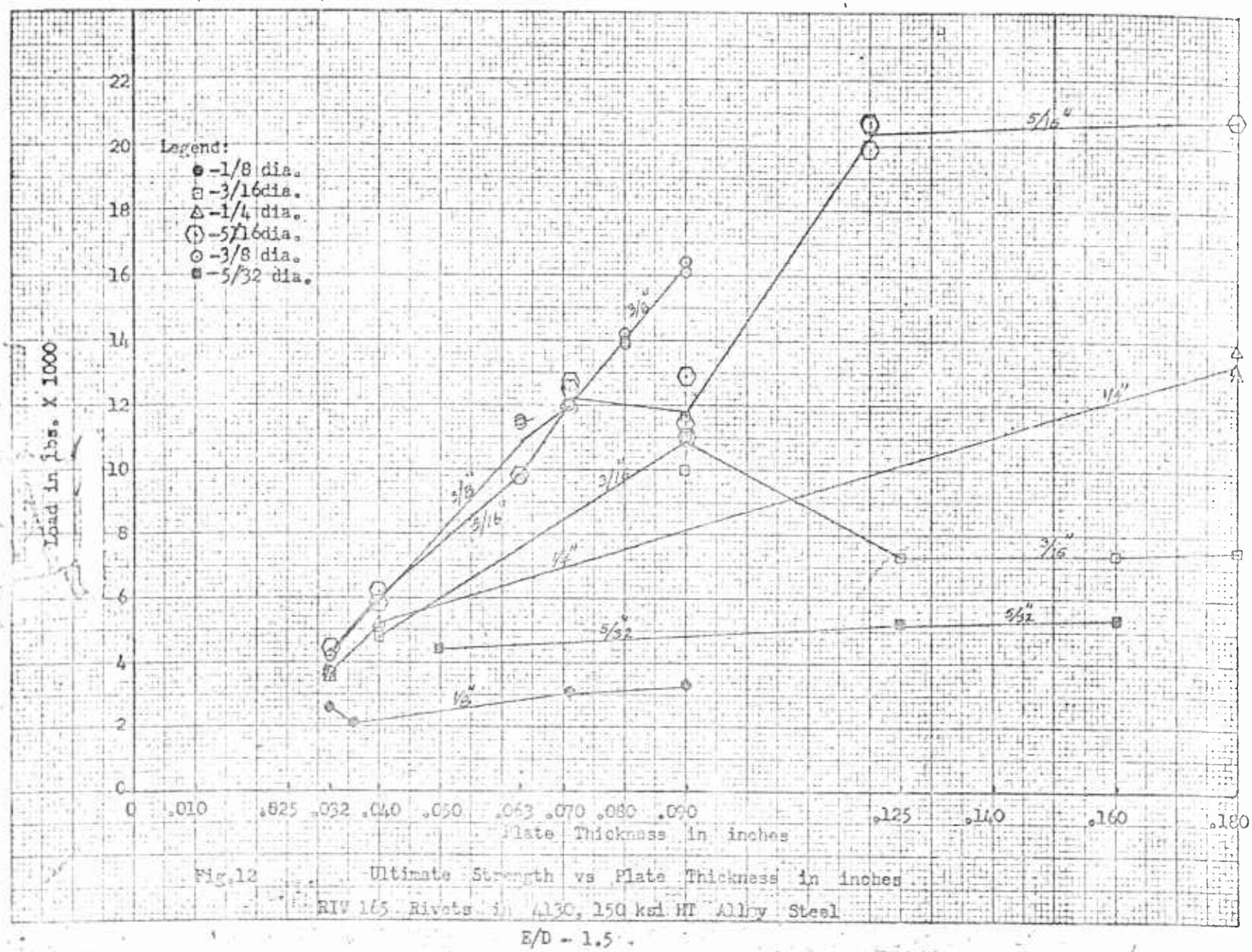

Fig.12 Ultimate Strength vs Plate Thickness in inches
RIV 165 Rivets in 4130, 150 ksi HT Alloy Steel
E/D - 1.5

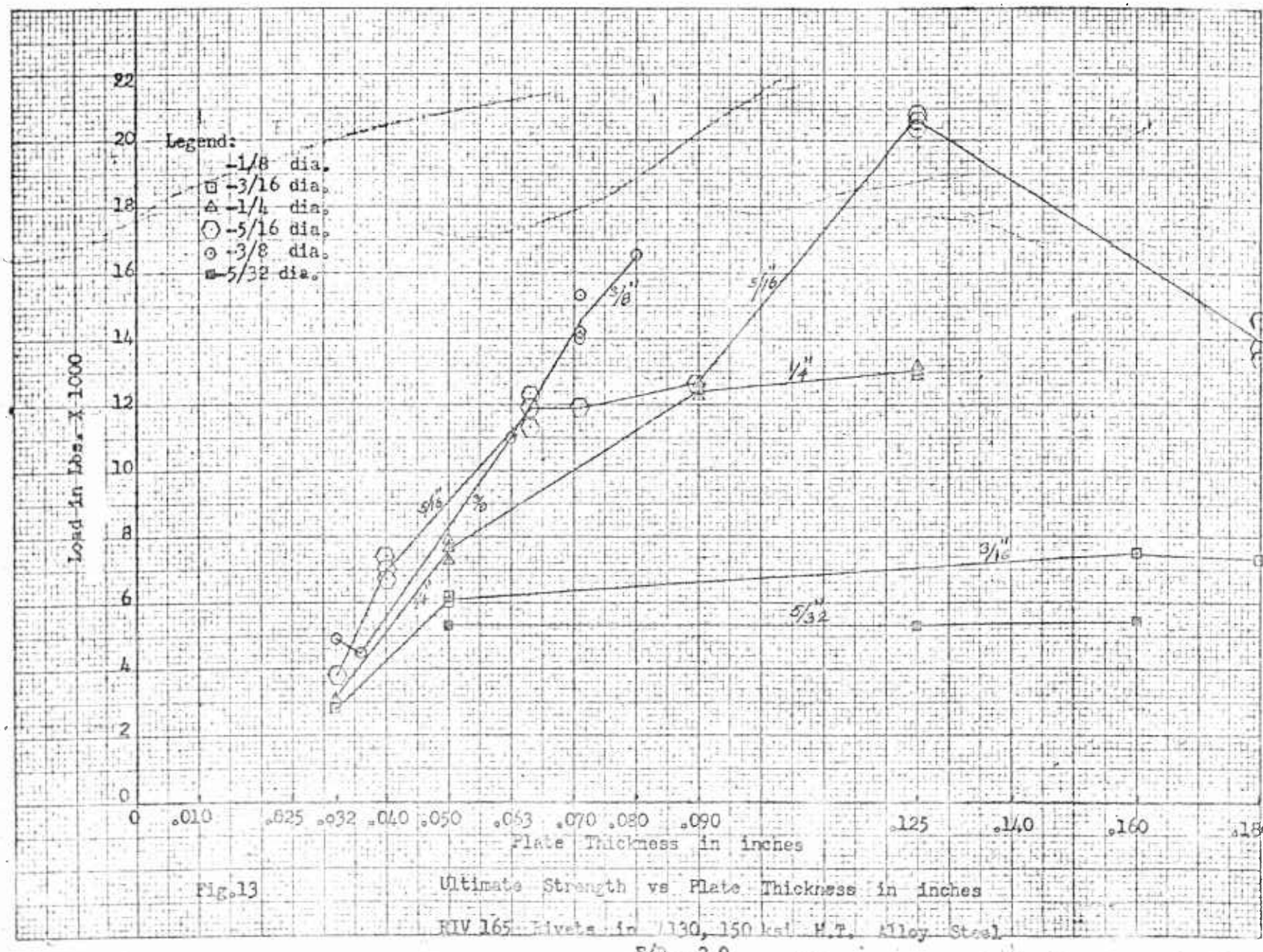

Fig.13 Ultimate Strength vs Plate Thickness in inches

RIV 165 Rivets in 130, 150 ksi H.T. Alloy Steel

E/D - 2.0

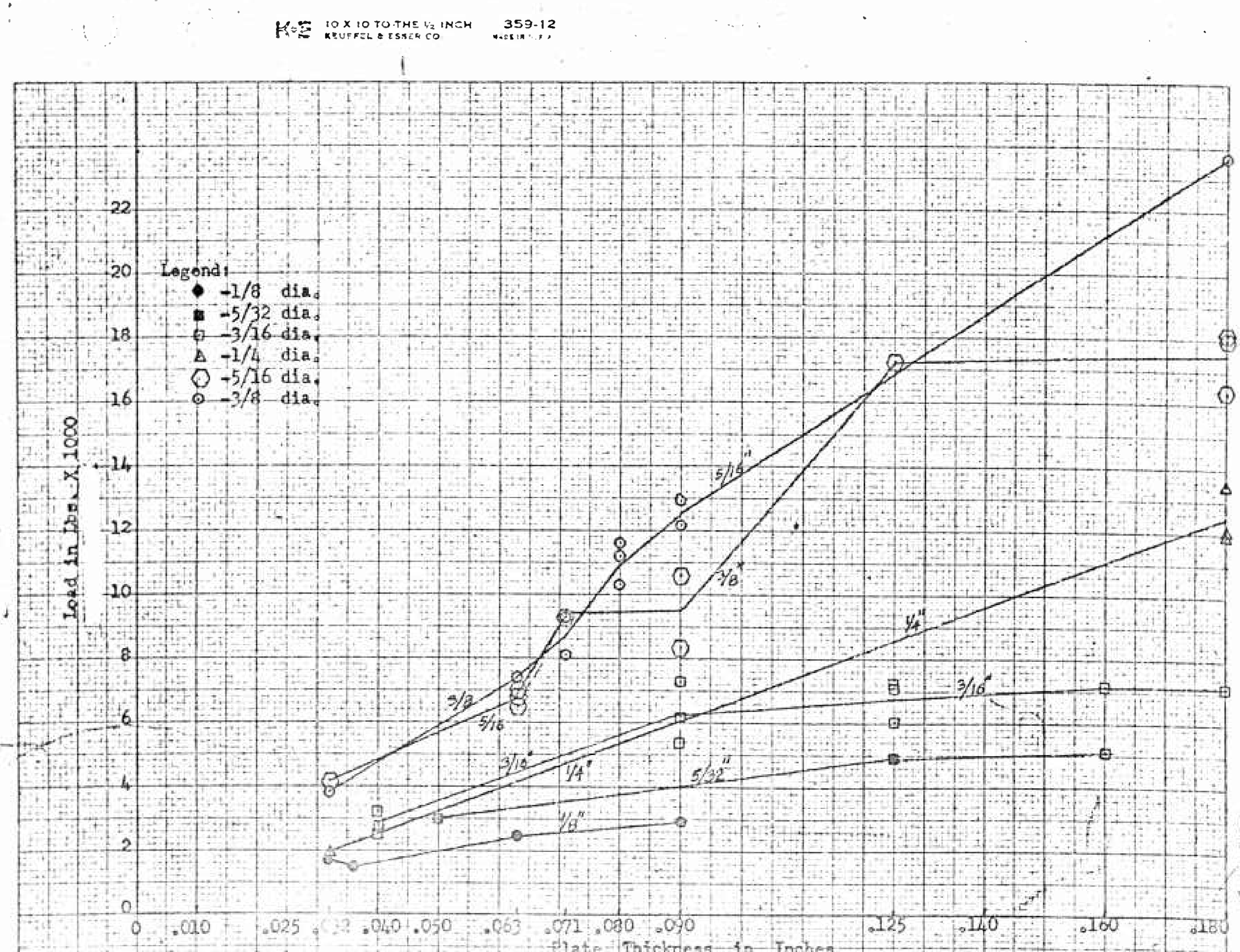

Fig.14

Yield Strength vs Plate Thickness in Inches
RIV 165 Rivets in 4130, 150 H.T. Alloy Steel
E/D = 3.5

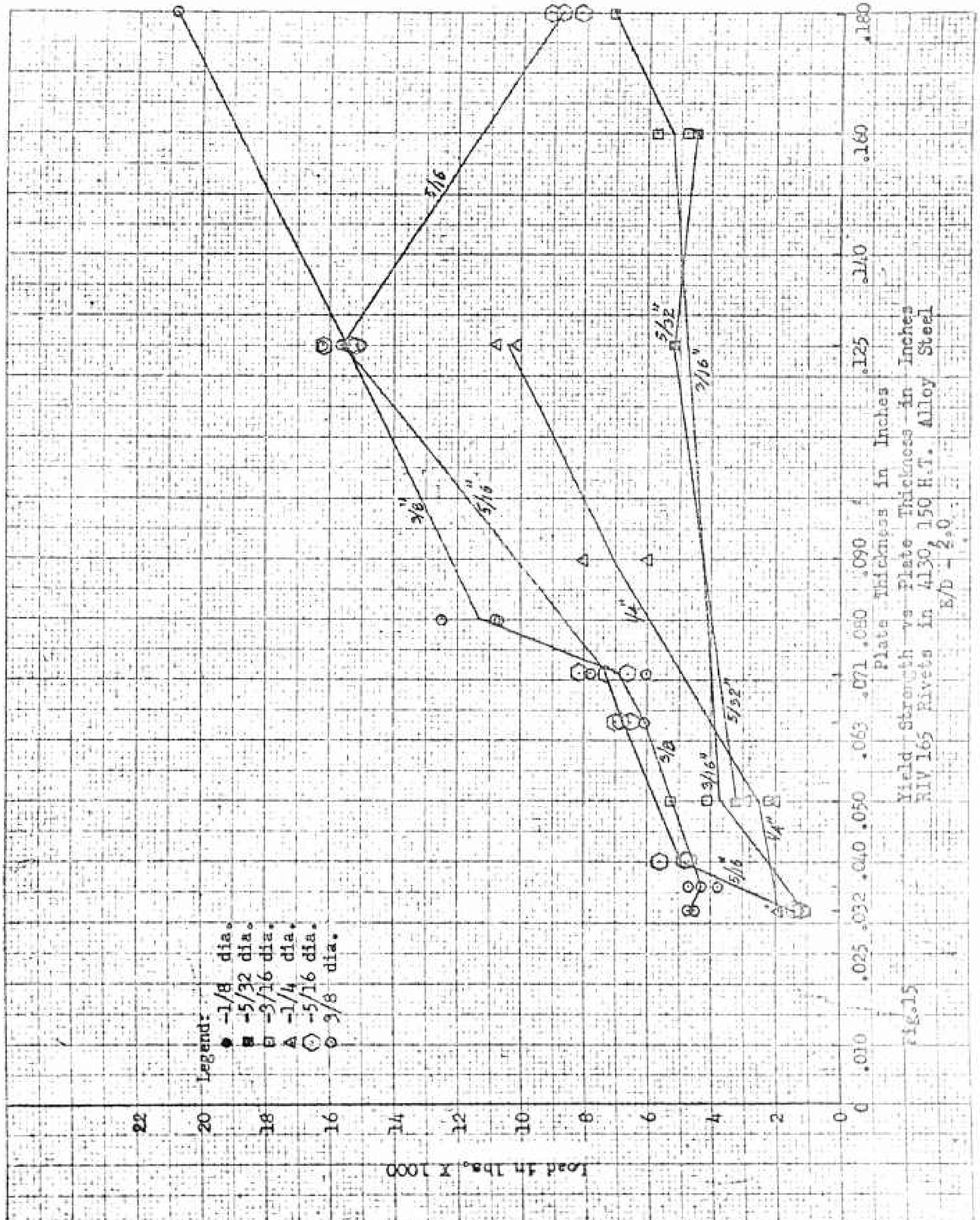

Fig.15 Yield Strength vs Plate Thickness in Inches
RIV 165 Rivets in 4130, 150 H.T. Alloy Steel
E/D - 2.0

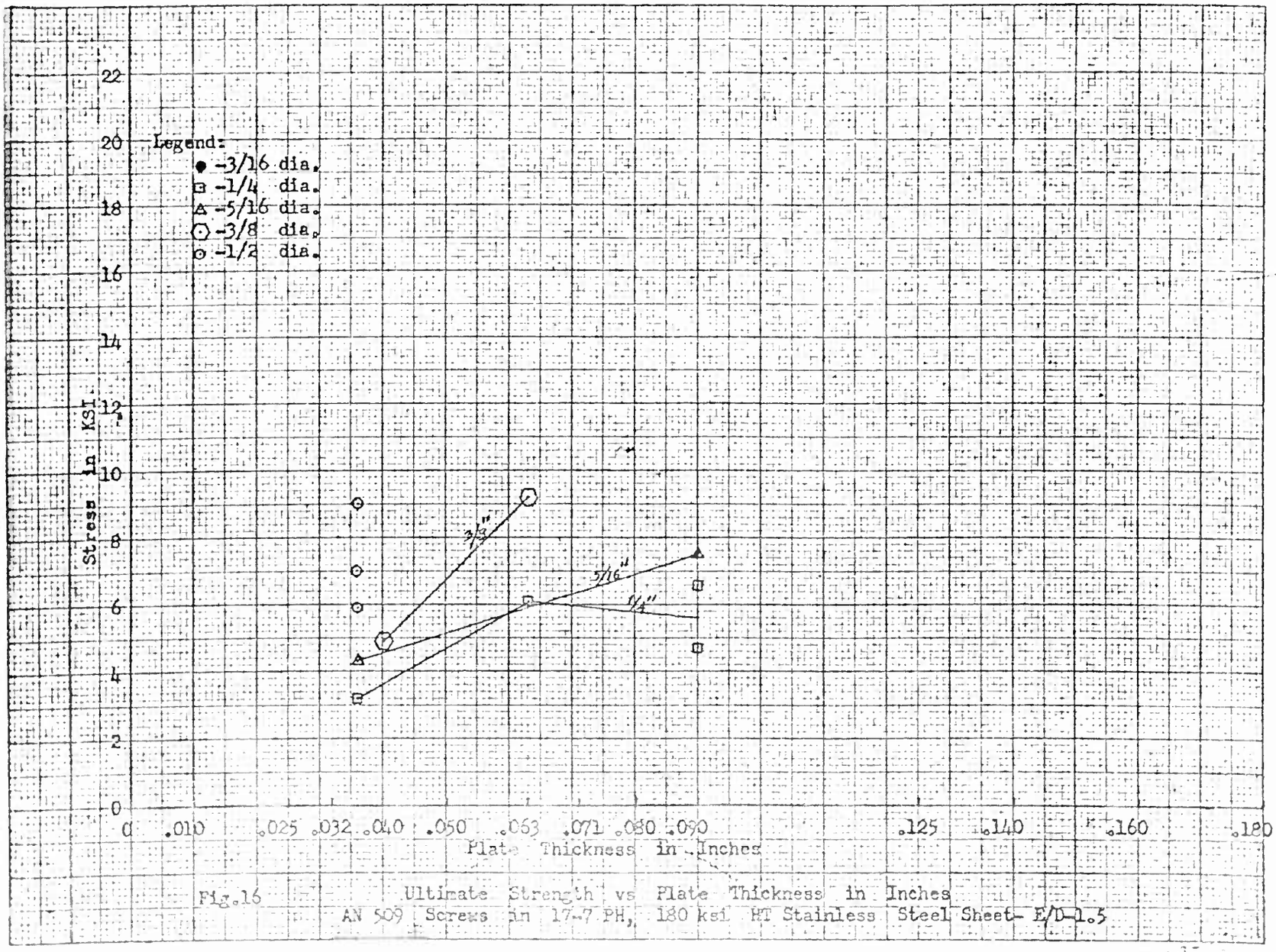

Fig.16 Ultimate Strength vs Plate Thickness in Inches
AN 509 Screws in 17-7 PH, 180 ksi HT Stainless Steel Sheet- E/D-1.5

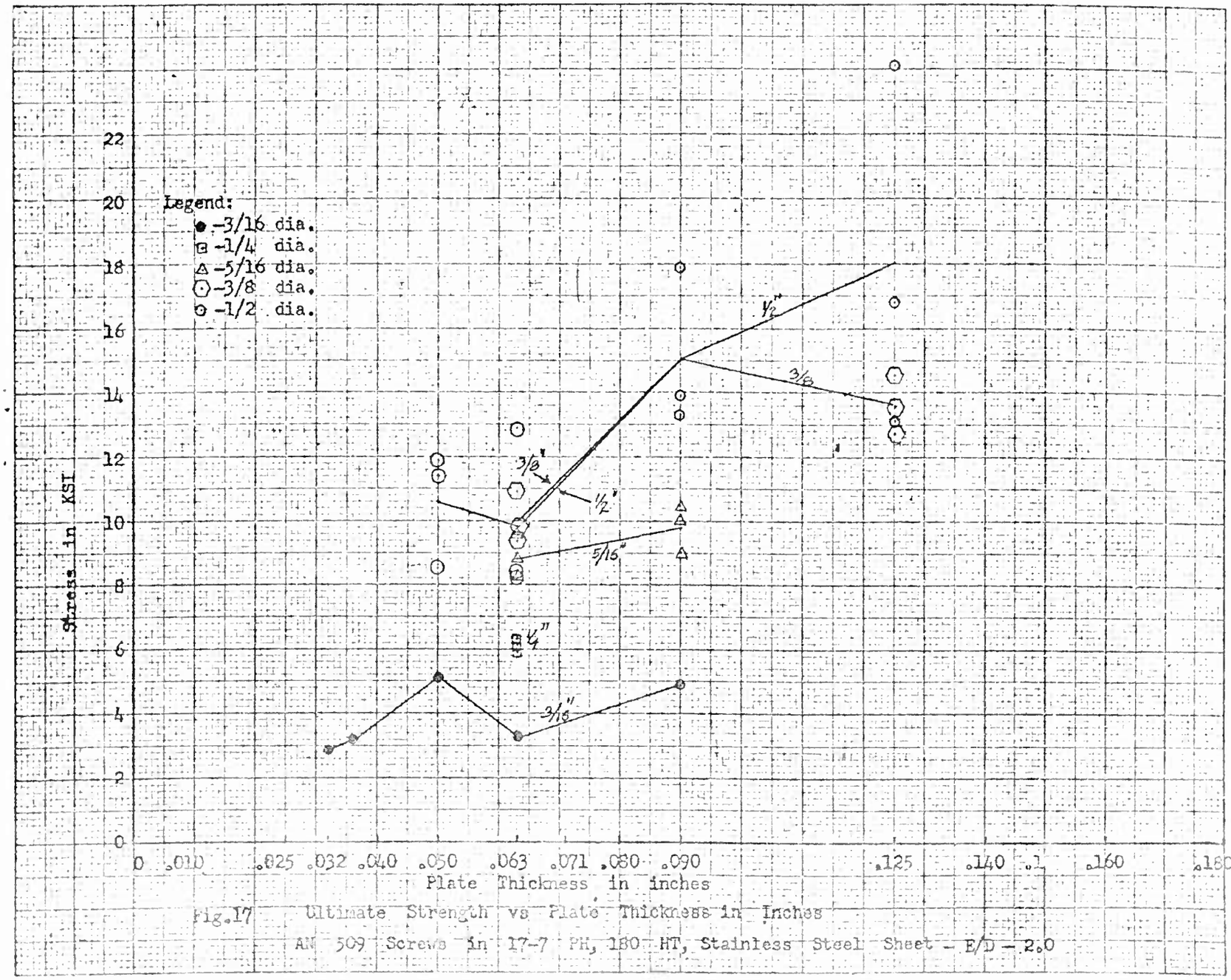

Fig.17 Ultimate Strength vs Plate Thickness in Inches
AN 509 Screws in 17-7 PH, 180 HT, Stainless Steel Sheet - E/D = 2.0

K&E 10 X 10 TO THE 1/2 INCH 359-12
KEUFFEL & ESSER CO. MADE IN U.S.A.

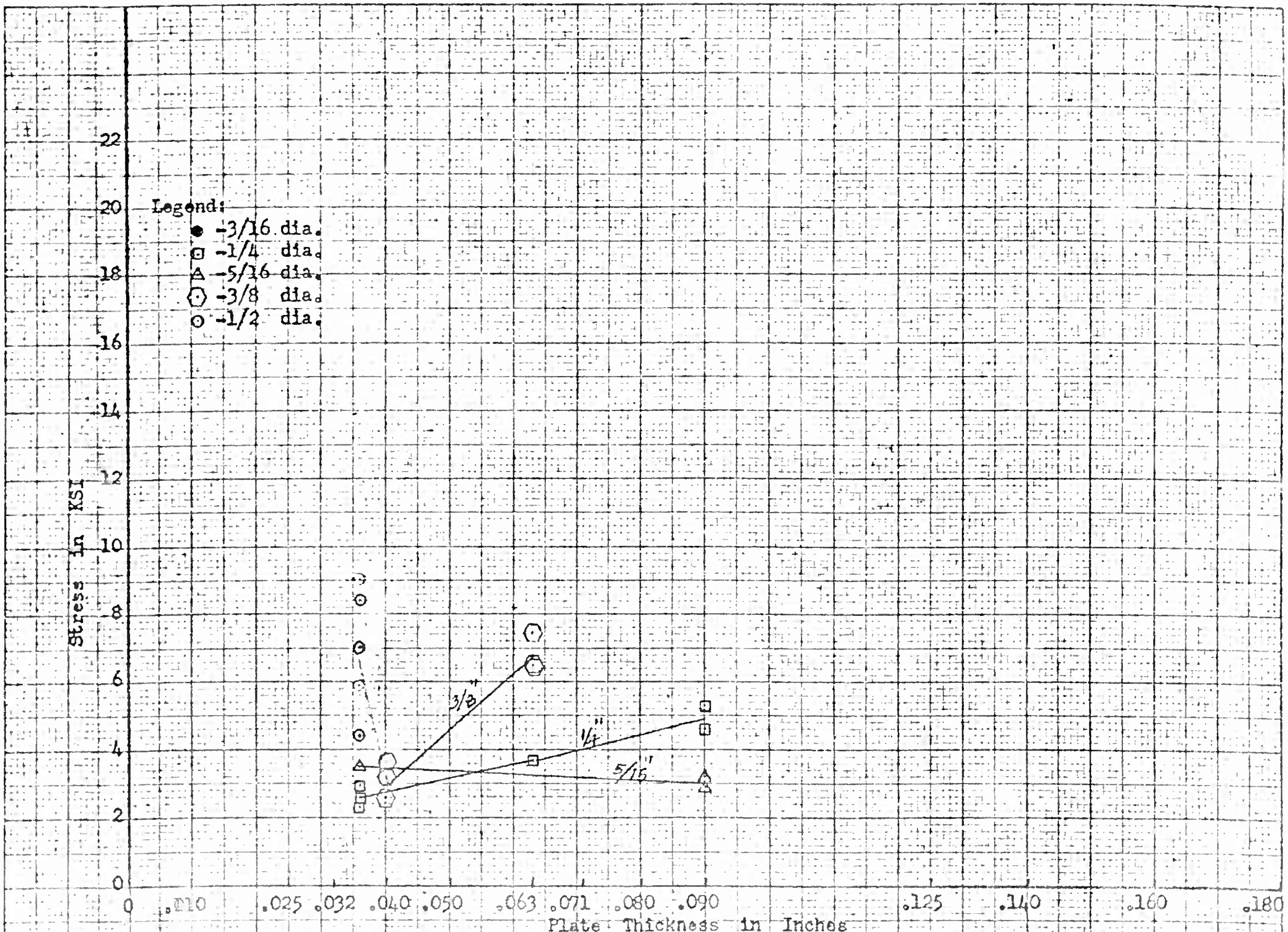

Fig.18 Yield Strength vs Plate Thickness in Inches
AN 509 Screws in 17-7 PH, 180 H.T. Stainless Steel Sheet
E/D/ - 1.5

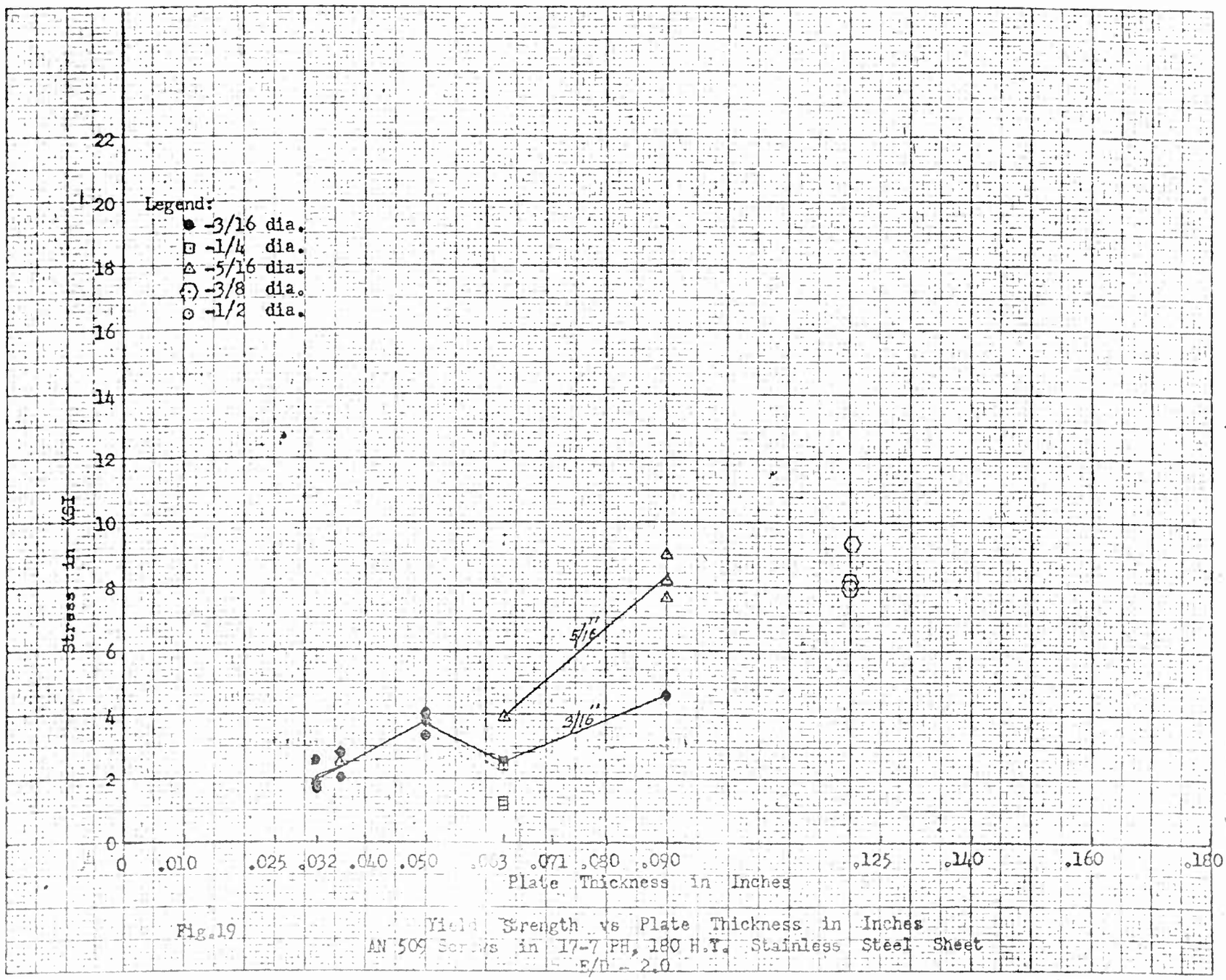

Fig.19 Yield Strength vs Plate Thickness in Inches
AN 509 Screws in 17-7 PH, 180 H.T. Stainless Steel Sheet
E/D = 2.0

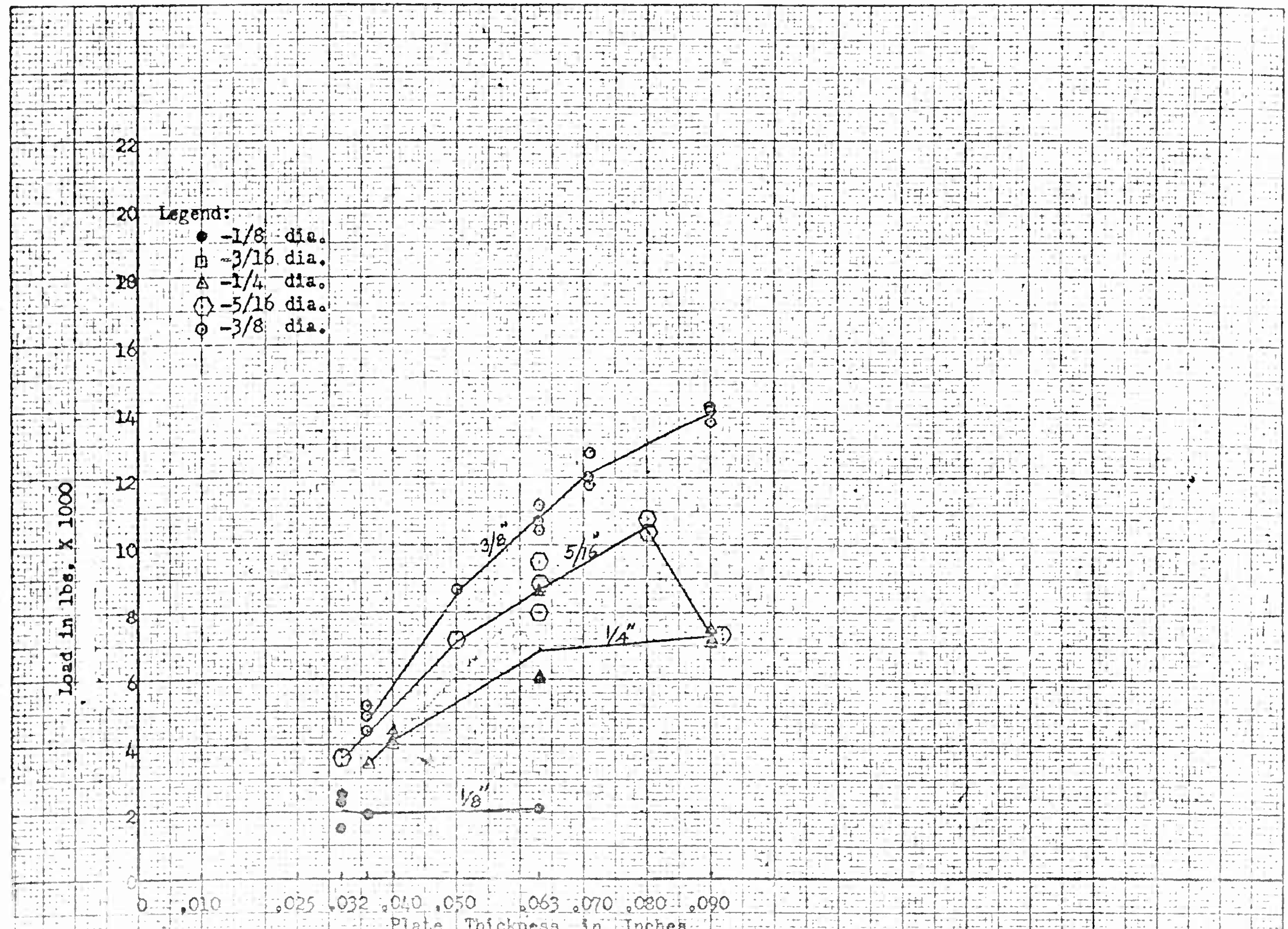

Fig. 20 Ultimate Strength vs Plate Thickness in Inches
NAS[illegible] Rivets in 17-7 PH, 180 HT Stainless Steel Sheet. E/D = 1.5

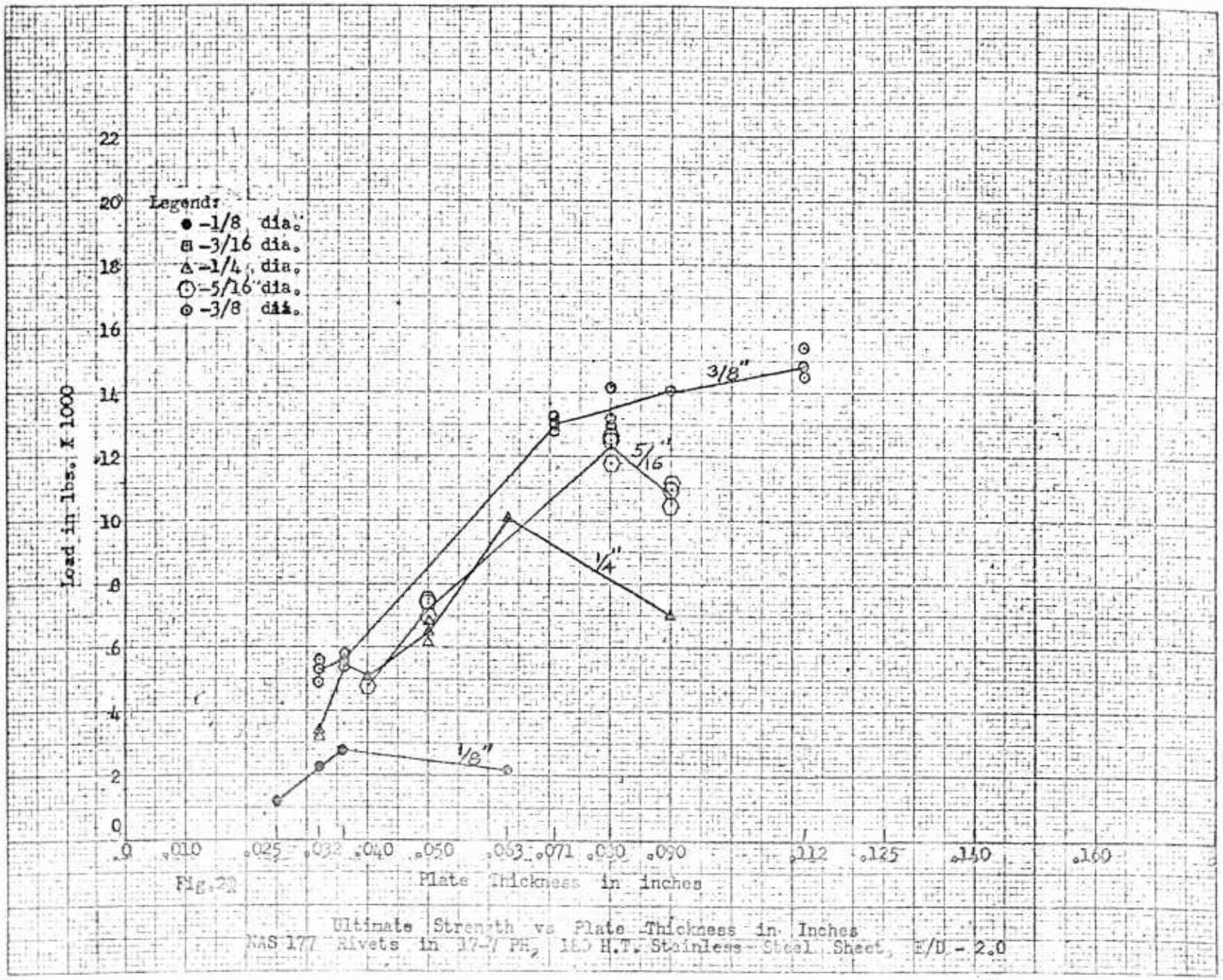

Fig. 22

Ultimate Strength vs Plate Thickness in Inches
NAS 177 Rivets in 17-7 PH, 185 H.T. Stainless Steel Sheet, E/D = 2.0

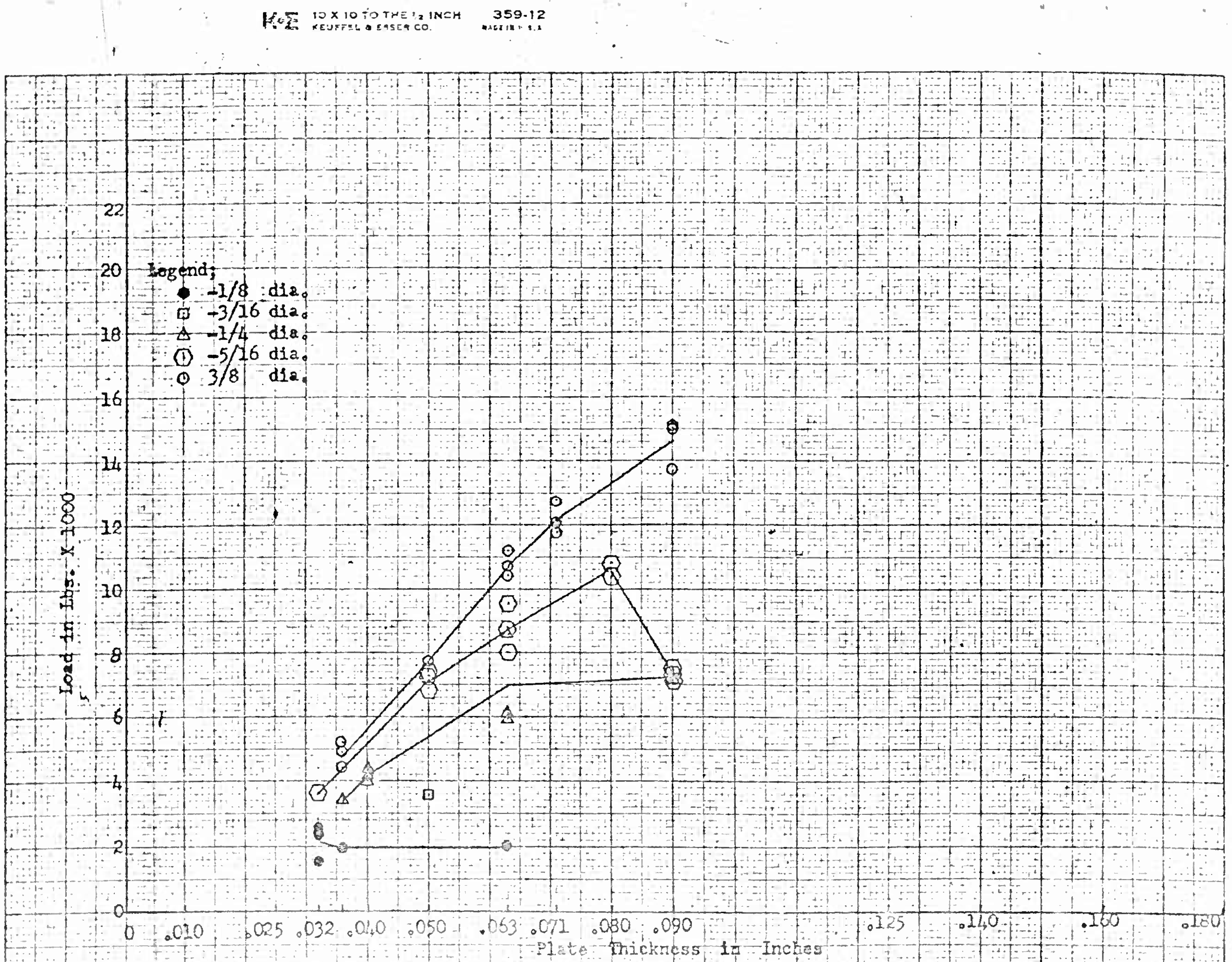

Fig. 22

Yield Strength vs Plate Thickness in Inches
NAS 177 Rivets in 17-7 PH, 180 H.T. Stainless Steel Sheet
E/D = 1.5

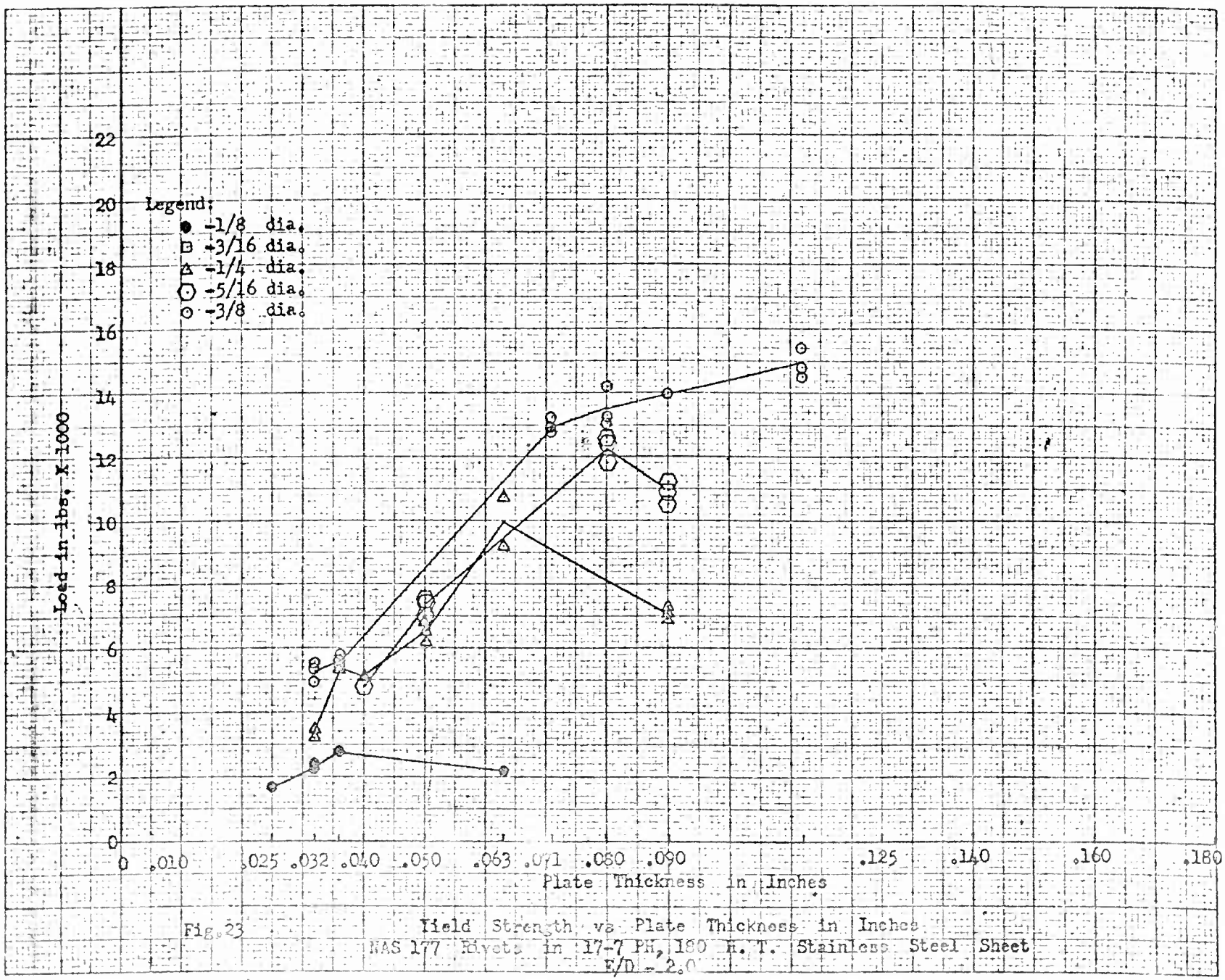

Fig. 23 Yield Strength vs Plate Thickness in Inches
NAS 177 Rivets in 17-7 PH, 180 H. T. Stainless Steel Sheet
E/D = 2.0

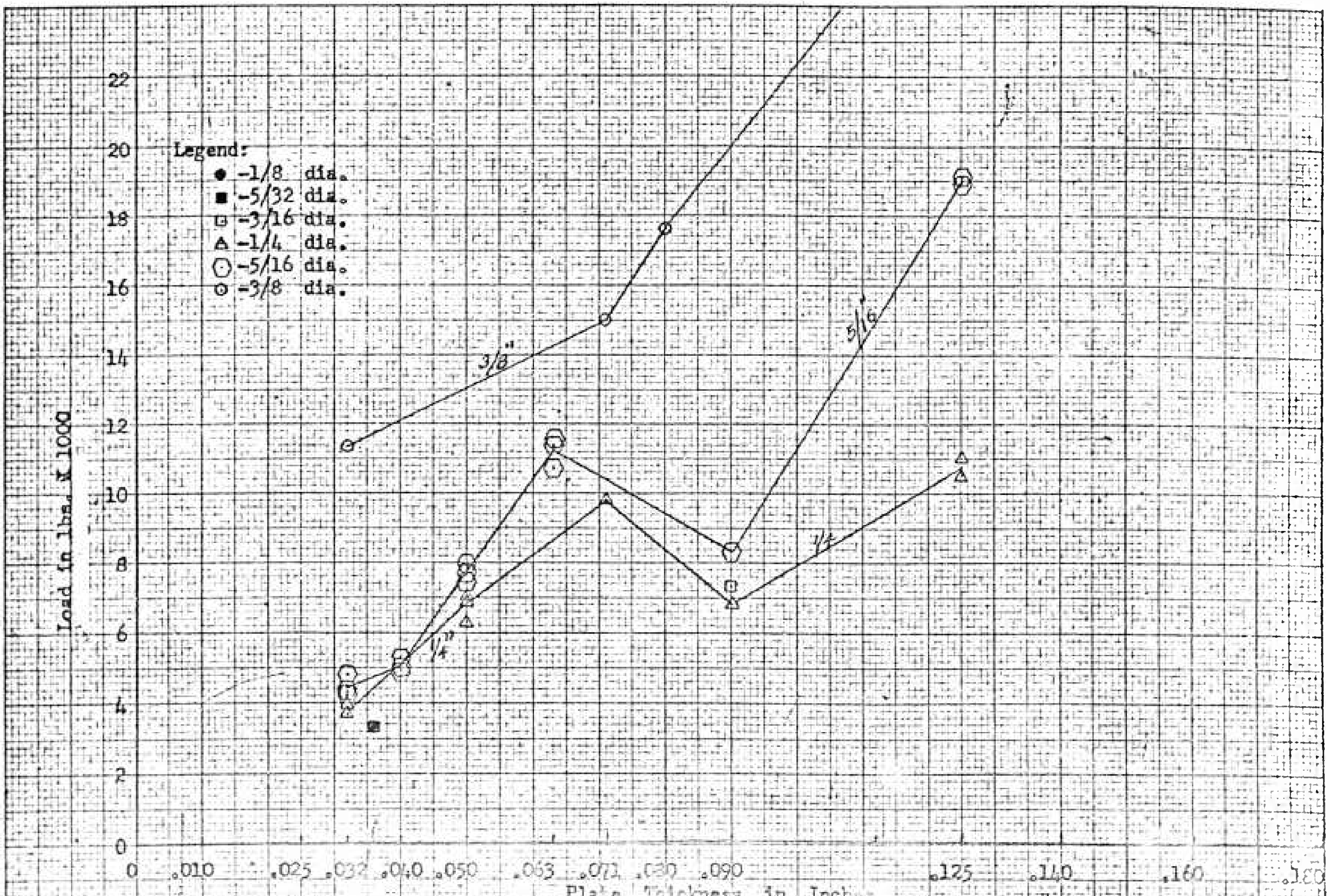

Fig. 24 Ultimate Strength vs Plate Thickness

RI 165 Riv[illegible] in 17-7 PH, [illegible]20 ksi H.T. Stainless Steel Sheet

E/D - 1.5

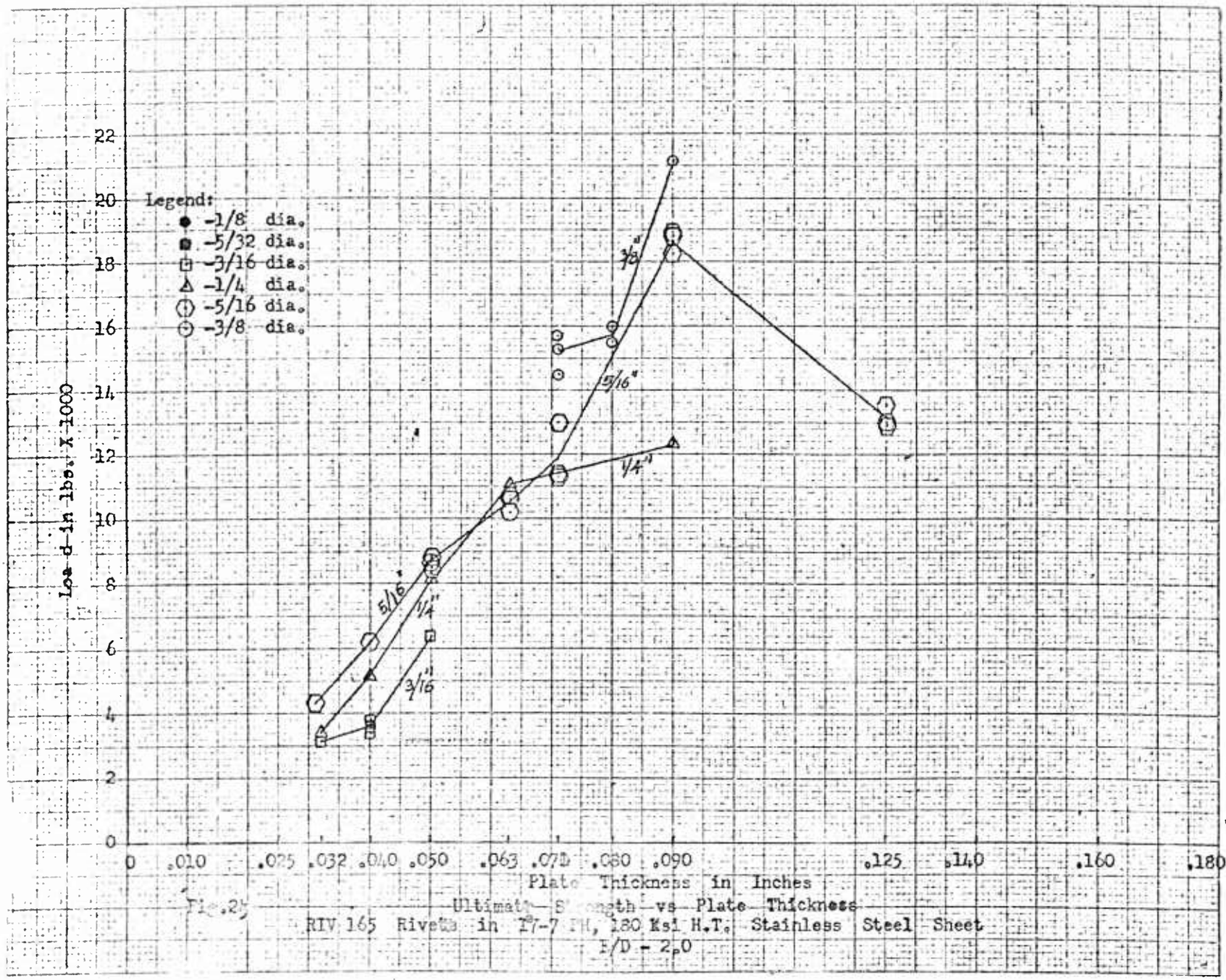

Fig. 25

Ultimate Strength vs Plate Thickness
RIV 165 Rivets in 17-7 PH, 180 Ksi H.T. Stainless Steel Sheet
E/D - 2.0

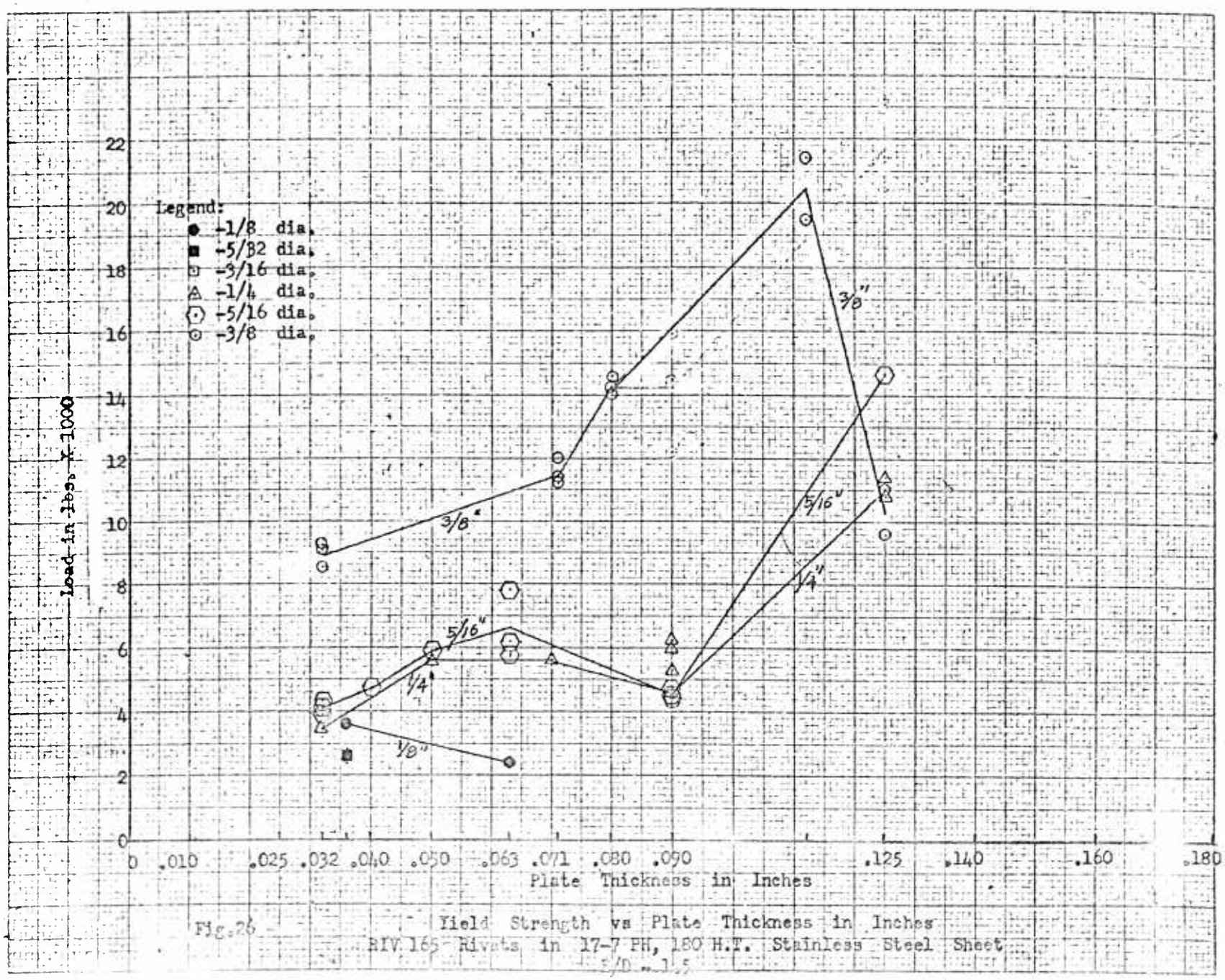

Fig.26 Yield Strength vs Plate Thickness in Inches
RIV 165 Rivets in 17-7 PH, 180 H.T. Stainless Steel Sheet
S/D = 1.5

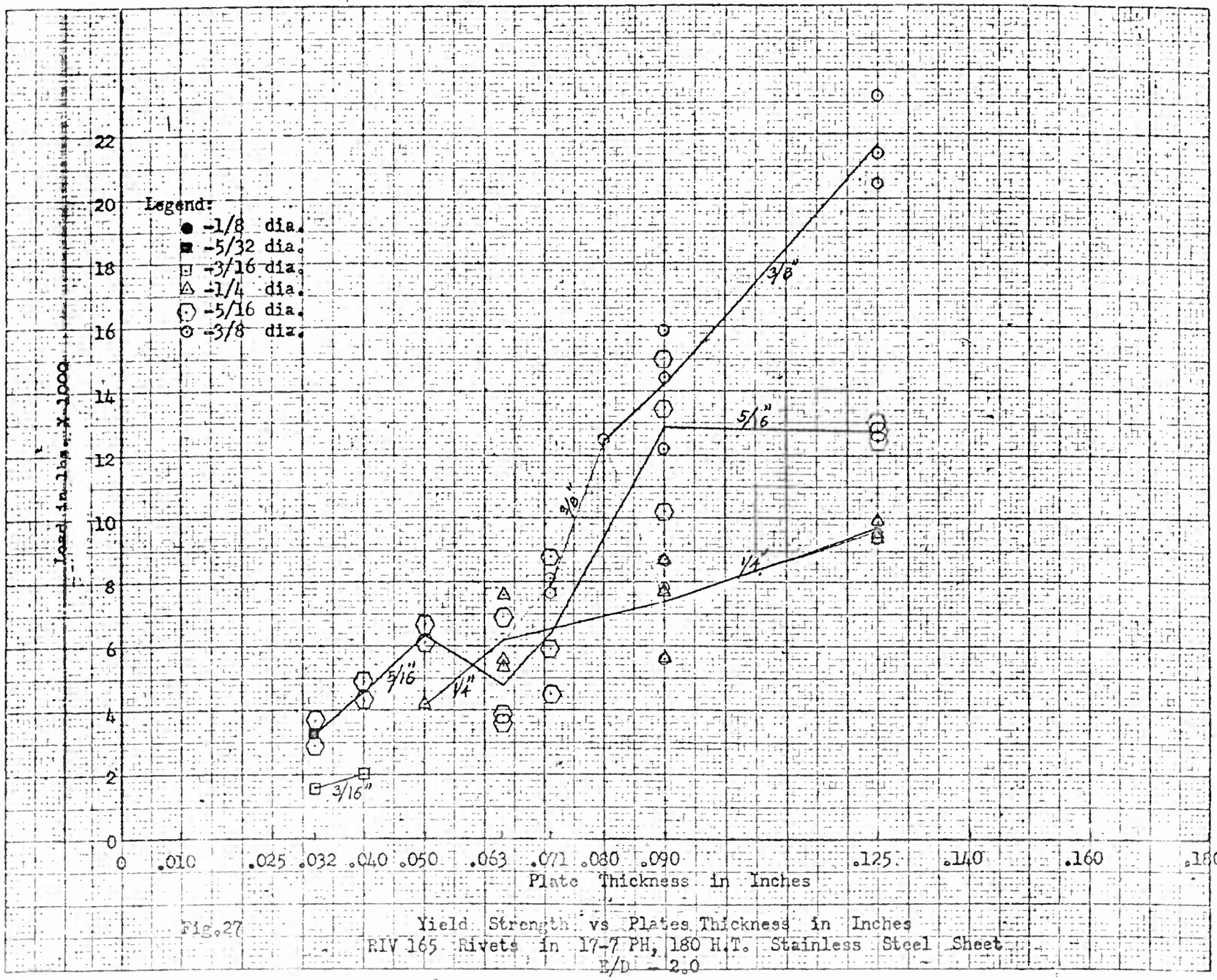

Fig.27 Yield Strength vs Plates Thickness in Inches
RIV 165 Rivets in 17-7 PH, 180 H.T. Stainless Steel Sheet
E/D = 2.0

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TABULATION SHEET TABLE I-AN 509 SCREWS IN 4130-150 H.T. ALLOY STEEL. pg 1

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs.	TYPE OF FAILURE
4-809-1	AN-509-816-22	2X5¼X.063	1.5	½"	9260	9540	tensile
-2					——	9160	
-3					7180	8680	
Avg					8220	9120	
2-845-1	AN509-816-22	2X6X.063	2.0	½"	7240	11620	bearing
-2					7720	11080	
-3					4000	9280	
Avg					6320	10660	
2-817-1		2X6X.090			6950	15360	tensile
-2					5920	15000	bearing
-3					——	10580	shear
Avg					6435	13650	
2-801-1		2X6X.125			——	15850	tensile
-2					——	19900	"
-3					10050	19900	
Avg					10050	18550	
3-841-1		2X6X.160			22750	25000	tensile
-2					——	27550	
-3					——	27400	
Avg					22750	26650	
3-833-1		2X6X.180			——	27850	shear
-2					——	24800	
-3							
Avg					——	26325	
3-823-1		2X6X.250			24700	29400	shear
-2					16500	31050	
-3					15100	27800	
Avg					18770	29410	

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TABULATION SHEET TABLE I CONT. AN 509 SCREWS IN 4130-150 H.T. ALLOY STEEL. pg 2

SPECIMEN NO.	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs.	ULT. lbs	TYPE FAILURE
1-813-1	AN509-616-20	2 X 5½ X .040	2.0	3/8"	4540	7280	bearing
-2					2400	8020	
-3					3440	7980	
Avg					3460	7760	
2-885-1		2 X 5½ X .063			5420	12120	bearing
-2					5750	11880	
-3					6050	11200	
Avg					5740	11735	
2-851-1		2 X 5½ X .125			7030	14600	shear
-2					8230	13980	
-3					7380	14660	
Avg					7550	14415	
3-871-1		2 X 5½ X .160			8650	13740	shear
-2					8000	14840	
Avg					8325	14190	
3-865-1		2 X 5½ X .180			12600	14480	shear
-2					13600	15340	
-3					13900	15600	
Avg					13370	15140	
4-831-1	AN509-616-20	2 X 5 5/16 X .040	1.5	3/8"	—	7380	bearing
-2					3200	6960	
-3					1700	6400	
Avg					2450	6910	
4-857-1		2 X 5 5/16 X .063			5900	10760	bearing
-2					—	10680	
-3					6080	11460	
Avg					5990	10965	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE I-CONT. AN 509 SCREWS IN 4130-150 H.T. ALLOY STEEL. pg 3

SPECIMEN NO.	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT lbs.	TYPE OF FAILURE
5-815-1	AN509-616-20	2X5 5/16X.140	1.5	3/8"	5760	12580	shear
-2					5840	11560	
Avg					5800	12070	
5-857-1		2X5 5/16X.160			10670	12440	shear
-2					10480	13260	
-3					10480	12500	
Avg					10540	12735	
5-851-1		2X5 5/16X.180			12450	13600	shear
-2					12200	13000	
Avg					12325	13300	
1-875-1	AN 509-516-19	2X5 1/4X.036	2.0	5/16"	3270	4190	bearing
-2					3575	4050	
-3					3230	4060	
Avg					3360	4100	
2-813-1		2X5 1/4X.100			5270	9540	shear
-2					6080	9640	
-3					6000	8950	
Avg					5780	9380	
2-855-1		2X5 1/4X.125			6100	7620	shear
-2					6160	7640	
-3					6080	7640	
Avg					6110	7635	
2-5-1		2X5 1/4X.140			10080	10640	shear
-2					9220	10840	
-3					9400	10520	
Avg					9570	10665	
2-869-1		2X5 1/4X.180			12150	13800	shear
-2					11600	13200	
Avg					11875	13500	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE I CONT.-AN 509 SCREWS IN 4130-150 H.T. ALLOY STEEL. pg 4.

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs.	TYPE OF FAILURE
5-867-1	AN509-516-19	2X5 3/32 X.125	1.5	5/16"	7450	8680	shear
-2					8340	9720	
-3					7420	7720	
Avg					7740	8710	
5-817-1		2X5 3/32 X.140			—	9000	shear
-2					—	9280	
-3					—	8800	
Avg					—	9030	
5-859-1		2X5 3/32 X.160			9620	12060	shear
-2					9500	11720	
-3					9300	11800	
Avg					9470	11860	
4-865-1	AN509-416-18	2X4 3/8 X.063	1.5	1/4"	—	6100	shear
-2					—	5920	
-3					—	6640	
Avg					—	6220	
A-807-1		2X4 3/8 X.071			3400	7200	shear
-2					3000	7160	
-3					2200	6800	
Avg					2870	7050	
4-5-1		2X4 3/8 X.080			5250	6640	shear
-2					4710	6540	
-3					4930	6160	
Avg					4960	6450	
5-883-1		2X4 3/8 X.090			—	8080	shear
-2					—	7390	
Avg					—	7730	
5-833-1		2X4 3/8 X.100			1720	4980	shear
-2					1570	4940	
-3					1180	4920	
Avg					1490	4950	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE I CONT. - AN 509 SCREWS IN 4130-150 H.T. ALLOY STEEL. pg 5

SPECIMEN NO.	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
2-843-1	AN 509-416-18	2X5X.071	2.0	1/4"	5050	7520	shear
-2					4080	6680	
-3					3900	6940	
Avg					4340	7050	
2-835-1		2X5X.080			2870	5320	shear
-2					3500	5470	
-3					3450	5980	
Avg					3270	5590	
2-871-1		2X5X.090			5040	6580	shear
-2					5140	5200	
-3					5280	6020	
Avg					5150	5930	
2-859-1		2X5X.125			—	7800	shear
-2					—	6620	
-3					—	7200	
Avg					—	7210	
3-859-1	AN 509-10-17	1½X4 9/32X.032	1.5	3/16"	2230	3070	bearing
-2					2080	3040	
-3					2050	2840	
Avg					2120	2980	
4-889-1		1½X4 9/32X.036			2090	3080	bearing
-2					2230	3280	
-3					2140	3285	
Avg					2150	3215	
1-877-1		1½X4 9/32X.050			3075	3275	bearing
-2					3515	4125	
-3					3530	4360	
Avg					3370	4085	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE I CONT.-AN 509 SCREWS IN 4130-150 H.T. ALLOY STEEL. pg 6.

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
4-869-1	AN509-10-17	1½ X 4 9/32 X .063	1.5	3/16"	—	4870	shear
-2					3180	4545	
-3					3280	4610	
Avg					3230	4675	
4-801-1		1½ X 4 9/32 X .080			3000	3520	shear
-2					2890	3105	
-3					3100	3560	
Avg					3000	3395	
1-881-1		1½ X 4½ X .036	2.0		1740	3100	bearing
-2					1830	3130	
-3					1850	2465	
Avg					1810	2900	
1-867-1		1½ X 4 3/4 X .050			—	2535	bearing
-2					—	2610	
-3					—	4000	
Avg					—	3050	
2-837-1		1½ X 4 3/4 X .080			3180	3740	shear
-2					3130	4065	
-3					3150	3930	
Avg					3150	3910	
5-887-1		1½ X 4 3/4 X .090			3235	3315	shear
-2					3160	3190	
-3					3200	3320	
Avg					3200	3275	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE II. NAS 177 RIVETS IN 4130-150 H.T. ALLOY STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
4-841-1	NAS 177-12-8	2X5 5/16X.036	1.5	3/8"	—	5280	tensile
-2					—	5360	
-3					—	5280	
Avg					—	5310	
4-811-1		2X5 5/16X.063			7420	10360	bearing
-2					7450	10820	
-3					7430	9980	
Avg					7430	10390	
4-1-1		2X5 5/16X.080			9800	12800	shear
-2					10700	13600	
Avg					10250	13200	
5-821-1		2X5 5/16X.125			9220	13800	shear
-2					9000	14380	
-3					10180	14140	
Avg					9470	14110	
5-857-1		2X5 5/16X.160			17960	18480	shear
-2					17960	18580	
-3					—	19000	
Avg					17960	18685	
5-3-1		2X5 5/16X.180			17800	19200	shear
-2					17940	19480	
-3					—	19060	
Avg					17870	19250	
1-835-1		2X5 1/2X.032	2.0		—	4600	bearing
-2					—	4720	
-3					—	4680	
Avg					—	4665	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE II CONT - NAS 177 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL. pg 2

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
1-823-1	NAS 177-12-8	2 X 5½ X .036	2.0	3/8"	4330	4425	bearing
-2					3540	4065	
-3					2570	3990	
Avg					3480	4160	
2-847-1		2 X 5½ X .063			7920	10740	shear
-2					5740	10530	
-3					5760	10430	
Avg					6470	10565	
2-839-1		2 X 5½ X .071			7520	11640	shear
-2					7460	12380	
Avg					7490	12010	
2-831-1		2 X 5½ X .080			—	14450	shear
-2					8850	14330	
-3					—	14040	
Avg					8850	14275	
2-819-1		2 X 5½ X .090			8600	14060	shear
-2					7820	14160	
-3					10600	14080	
Avg					9010	14100	
2-803-1		2 X 5½ X .125			13900	17630	shear
-2					12400	16880	
-3					14120	17280	
Avg					13470	17265	
3-843-1		2 X 5½ X .160			—	18840	shear
-2					—	18760	
-3					17250	18620	
Avg					17250	18740	

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CONVAIR — FORT WORTH

TABULATION SHEET TABLE II CONT-NAS 177 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL. pg 3

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
3-801-1	NAS 177-10-8	2 X 5 3/32 X .032	1.5	5/16"	3700	4040	bearing
-2					—	4205	
-3					3440	3610	
Avg					3570	3950	
A-843-1		2 X 5 3/32 X .036			4340	4350	bearing
-2					4000	4630	
-3					4060	4700	
Avg					4130	4560	
4-805-1		2 X 5 3/32 X .071			7900	11300	bearing
-2					7250	10700	
-3					8470	11460	
Avg					7870	11150	
4-3-1		2 X 5 3/32 X .080			7620	11000	shear
-2					7180	10720	
-3					7150	11580	
Avg					7320	11100	
4-813-1		2 X 5 3/32 X .063			6250	9000	bearing
-2					5200	8920	
-3					4100	8960	
Avg					5180	8960	
5-823-1		2 X 5 3/32 X .125			—	12420	shear
-2					11700	12240	
-3					—	17880	
Avg					11700	14180	
5-809-1		2 X 5 3/32 X .160			14000	14180	shear
-2					13700	13890	
-3					13100	13460	
Avg					13600	13845	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE II CONT.-NAS 177 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL. pg 4

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT lbs	TYPE OF FAILURE
5-5-1	NAS 177-10-8	2X5 3/32X.180	1.5	5/16"	——	14840	shear
-2					13780	14040	
-3					14400	14460	
Avg					14090	14450	
1-837-1		2X5 1/4X.032	2.0		3900	4810	bearing
-2					3330	4050	
-3					3640	4225	
Avg					3620	4360	
1-825-1		2X5 1/4X.036			3310	4025	bearing
-2					3250	3800	
-3					2650	3740	
Avg					3070	3850	
1-1'-1		2X5 1/4X.063			5960	6050	shear
-2					5990	9000	
-3					7090	9660	
Avg					6350	8235	
2-841-1		2X5 1/4X.071			6020	10760	bearing
-2					6650	10480	shear
-3					6340	10660	shear
Avg					6340	10635	
2-833-1		2X5 1/4X.080			7840	12800	shear
-2					8700	12200	
-3					8200	11740	
Avg					8250	12245	
2X821-1		2X5 1/4X.090			13900	16760	bearing
-2					10130	15540	
-3					11000	17400	
Avg					11680	16565	

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CONVAIR — FORT WORTH

TABULATION SHEET TABLE II CONT-NAS 177 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL pg 5

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs.	TYPE OF FAILURE
2-805-1	NAS 177-10-8	2 X 5¼ X .125	2.0	5/16"	10520	11600	shear
-2					10680	11560	
-3					10600	11460	
Avg					10600	11540	
3-845-1		2 X 5¼ X .160			12650	13080	shear
-2					12300	13420	
-3					——	13120	
Avg					12475	13210	
3-837-1		2 X 5¼ X .180			13980	14120	shear
3-803-1	NAS 177-8-8	2 X A⅞ X .032	1.5	¼"	2850	3235	bearing
-2					2440	3210	
Avg					2645	3220	
4-825-1		2 X A⅞ X .050			2940	5945	bearing
-2					3480	6100	
-3					2860	5720	
Avg					3090	5920	
4-815-1		2 X A⅞ X .063			8400	9180	bearing
-2					8350	9320	
-3					——	7120	
Avg					8375	8540	
5-825-1		2 X A⅞ X .125			10400	13480	shear
-2					11300	13030	
-3					10550	12520	
Avg					10750	13010	
1-817-1		2 X 5 X .040	2.0		3480	5760	bearing
-2					3230	5770	
Avg					3355	5765	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE II CONT-NAS 177 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL-pg 6

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST	YIELD lbs	ULT lbs	TYPE OF FAILURE
1-807-1	NAS177-8-8	2 X 5 X .050	2.0	1/4"	2300	6680	bearing
-2					1520	5440	
-3					2030	6050	
Avg					1950	6060	
1-3-1		2 X 5 X .063			3900	7600	shear
-2					3580	7740	
-3					4020	7880	
Avg					3830	7740	
2-823-1		2 X 5 X .090			5630	7840	shear
-2					4600	7420	
Avg					5115	7630	
2-807-1		2 X 5 X .125			8480	10940	shear
-2					8720	10980	
-3					10400	10860	
Avg					9200	10930	
4-847-1	NAS177-6-8	1½ X 4 9/32 X .036	1.5	3/16"	1930	3090	bearing
-2					1775	2930	
-3					1900	2930	
Avg					1870	2985	
4-837-1		1½ X 4 9/32 X .040			1900	3280	bearing
-2					——	3080	
Avg					1900	3180	
4-827-1		1½ X 4 9/32 X .050			2410	4005	shear
-2					2575	4105	
-3					2515	3750	
Avg					2500	3955	
5-841-1		1½ X 4 9/32 X .090			4740	6120	shear
-2					4390	6020	
-3					——	5560	
Avg					4565	5900	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE II CONT.-NAS 177 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL. pg 7

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
1-829-1	NAS 177-6-8	1½ X 4¾ X .036	2.0	3/16"	1750	2700	bearing
-2					1670	2420	
-3					——	2785	
Avg					1710	2635	
1-5-1		1½ X 4¾ X .063			3200	3945	bearing
-2					3560	4580	
Avg					3380	4260	
2-825-1		1½ X 4¾ X .090			4090	5040	shear
-2					4170	4800	
-3					——	4810	
Avg					4130	4885	
1-817-1	NAS 177-4-8	1 X 4½ X .025	2.0	1/8"	640	1575	bearing
-2					1245	1640	
-3					——	1485	
Avg					940	1565	
1-845-1		1 X 4½ X .032			1485	2025	shear
-2					1550	1920	
-3					——	2085	
Avg					1520	2010	

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CONVAIR — FORT WORTH

TABULATION SHEET TABLE III - RIV 165 RIVETS IN 4130-150 KSI H.T. ALLOY S EL.pg 1

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT lbs	TYPE OF FAILURE
1-885-1	RIV 165-12-12	2X5 5/16X.032	1.5	3/8"	3840	4265	bearing
4-811-1		2X5 5/16X.063			7420	11540	bearing
-2					7450	9700	
-3					7430	11430	
Avg					7430	10890	
4-851-1		2X5 5/16X.071			——	11960	tensile
-2					9300	12160	
-3					8120	11980	
Avg					8710	12030	
4-849-1		2X5 5/16X.080			11200	13980	tensile
-2					11600	13900	
-3					10300	14200	
Avg					11030	14025	
5-873-1		2X5 5/16X.090			12900	16400	bearing
-2					12180	16100	
Avg					12540	16250	
5-849-1		2X5 5/16X.180			26800	30600	shear
-2					23400	30850	
-3					21000	31100	
Avg					23730	30850	
6-833-1		2X5 5/16X.312			27750	30150	shear
-2					26300	30250	
-3					27500	30150	
Avg					27180	30180	
1-885-1		2X5 1/2X.032	2.0		4730	4900	bearing
-2					4460	4940	
Avg					3230	4920	

CONVAIR — FORT WOR

TABULATION SHE

TABLE III CONT-RIV 165 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL

SPECIMEN NO.	TYP FAS	OF NER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs.	TYPE OF FAILURE
1-873-1	RIV 165	-12-12	2X5½X.036	2.0	3/8"	4720	4920	bearing
-2						4280	4400	
-3						3820	4355	
Avg						4270	4560	
2-883-1			2X5½X.063			6080	11040	bearing
2-879-1			2X5½X.071			—	15280	bearing
-2						6000	14040	
-3						7800	14200	
Avg						6900	14505	
2-877-1			2X5½X.080			12520	16310	bearing
-2						10820	16320	
-3						10700	16820	
Avg						11350	16485	
2-849-1			2X5½X.125			16250	25850	shear
-2						14950	25000	
-3						15700	24550	
Avg						15630	25135	
3-863-1			2X5½X.180			16210	30150	shear
-2						25500	29750	
Avg						20850	29950	
3-817-1			2X5½X.312			—	30500	shear
-2						28500	30100	
-3						28000	30700	
Avg						28250	30435	
3-853-1	RIV 165	-10-12	2X5 3/32 X.032	1.5	5/16"	4200	4305	shear
-2						4340	4630	
-3						4120	4330	
Avg						4220	4420	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE III CONT.-RIV 165 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL

SPECIMEN NO	TYPE OF FASTENERS	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
4-833-1	RIV 165-10-12	2X5 3/32 X.040	1.5	5/16"	—	6220	bearing
-2					—	5780	
Avg					—	6000	
4-859-1		2X5 3/32 X.063			7000	9800	bearing
-2					6840	9800	
-3					6530	9900	
Avg					6790	9835	
4-853-1		2X5 3/32 X.071			9900	11940	bearing
-2					9460	12480	
-3					9200	12700	
Avg					9520	12375	
5-877-1		2X5 3/32 X.090			10600	12900	shear
-2					8300	11420	
-3					—	11060	
Avg					9450	11790	
5-865-1		2X5 3/32 X.125			17250	20700	shear
-2					—	20630	
-3					—	19930	
Avg					17250	20420	
5-853-1		2X5 3/32 X.180			18200	20580	shear
-2					18000	21400	
-3					16350	20600	
Avg					17520	20860	
6-841-1		2X5 3/32 X.250			17650	20320	shear
-2					17850	20800	
-3					18950	20460	
Avg					18150	20790	
6-835-1		2X [illegible] X.312			18750	20960	shear
-2					17700	20640	
Avg					18225	20800	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE III CONT-RIV 165 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
1-843-1	RIV 165-10-12	1¼X4⅝X.032	2.0	5/16"	—	2855	bearing
-2					1440	2730	
-3					1240	2725	
Avg					1340	2770	
1-815-1		2X5¼X.040			5600	7040	bearing
-2					4750	7440	
-3					4820	6720	
Avg					5060	7065	
1-819-1		2X5¼X.063			7000	11960	shear
-2					6840	11360	
-3					6530	12350	
Avg					6790	11890	
2-881-1		2X5¼X.071			8150	12030	shear
-2					6600	11680	
-3					7340	12030	
Avg					7360	11915	
2-865-1		2X5¼X.090			—	12650	shear
2-853-1		2X5¼X.125			15390	20440	shear
-2					15180	20680	
-3					16200	20820	
Avg					15590	20645	
3-867-1		2X5¼X.130			—	13660	shear
-2					8200	13480	
-3					9100	14620	
Avg					8650	13920	
3-825-1		2X5¼X.250			16700	16900	shear
-2					16500	16700	
-3					16500	16780	
Avg					16570	16790	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE III CONT.- RIV 165 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT lbs	TYPE OF FAILURE
3-819-1	RIV 165-10-12	2X5¼X.312	2.0	5/16"	13100	13960	shear
-2					8800	14100	
-3					——	13870	
Avg					10950	13975	
3-855-1	RIV 165-8-12	2X4⅞X.032	1.5	¼"	1850	3845	bearing
-2					1830	3730	
-3					1950	3520	
Avg					1875	3700	
4-879-1		2X4⅞X.040			——	5315	bearing
-2					——	5170	
Avg					——	5240	
5-801-1		2X4⅞X.180			11900	13000	shear
-2					12000	13160	
-3					13500	13360	
Avg					12470	13340	
6-843-1		2X4⅞X.250			12100	13060	shear
-2					11650	13120	
-3					11700	13100	
Avg					11820	13090	
1-889-1		2X5 X.032	2.0		1850	3190	bearing
-2					1830	3120	
-3					1950	3100	
Avg					1880	3140	
1-863-1		2X5 X.050			——	7700	bearing
-2					2920	7860	
-3					2040	7320	
Avg					2480	7630	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE III CONT.-RIV 165 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs.	TYPE OF FAILURE
2-869-1	RIV 165-8-12	2 X 5 X .090	2.0	1/4"	——	12280	shear
-2					8100	12680	bearing
-3					6000	12560	
Avg					7050	12500	
2-857-1		2 X 5 X .125			10580	13140	shear
-2					10220	12960	
-3					——	13240	
Avg					10400	13110	
3-827-1		2 X 5 X .250			——	13060	shear
-2					12240	13260	
-3					12930	13120	
Avg					12585	13150	
4-881-1		1½ X 4 9/32 X .040	1.5	3/16"	2560	4800	bearing
-2					3230	4790	
-3					2670	4845	
Avg					2820	4810	
5-881-1		1½ X 4 9/32 X .090			6210	11040	bearing
-2					7300	11630	
-3					5410	10060	
Avg					6310	10910	
5-827-1		1½ X 4 9/32 X .125			7200	7420	shear
-2					7100	7340	
-3					6050	7300	
Avg					6780	7350	
5-811-1		1½ X 4 9/32 X .160			7100	7320	shear
-2					7110	7380	
-3					7250	7440	
Avg					7150	7380	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE III CONT-RIV 165 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL

SPECIMEN NO.	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE				pg 7
5-803-1	RIV 165-6-12	1½ X 4 3/32 X .180	1.5	3/16	7240	7580	shear				
-2					7100	7540					
-3					7150	7360					
Avg					7160	7490					
6-845-1		1½ X 4 9/32 X .250			7180	7560	shear				
-2					7220	7540					
-3					7450	7680					
Avg					7280	7590					
1-891-1		1½ X 4 3/4 X .032	2.0		850	2810	bearing				
-2					1350	2740					
-3					980	2900					
Avg					1060	2815					
1-865-1		1½ X 4 3/4 X .050			5250	6200	bearing				
-2					4150	6000					
Avg					4700	6100					
3-847-1		1½ X 4 3/4 X .160			4770	7550	shear				
-2					5750	7500					
Avg					5260	7525					
3-839-1		1½ X 4 3/4 X .180			7080	7140	shear				
-2					7220	7400					
-3					7140	7320					
Avg					7150	7290					
4-829-1	RIV 165-5-12	1¼ X 4¼ X .050	1.5	5/32"	3150	4290	bearing				
-2					2850	4545					
-3					3075	4400					
Avg					3025	4410					
5-829-1		1¼ X 4¼ X .125			4830	5325	shear				
-2					5020	5160					
-3					4770	5315					
Avg					4870	5270					

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CONVAIR — FORT WORTH

TABULATION SHEET TABLE III CONT.- RIV 165 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL.

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT lbs	TYPE OF FAILURE	pg 8
5-813-1	RIV 165-5-12	1¼X4¼X.160	1.5	5/32"	—	5400	shear	
-2					5150	5335		
-3					5075	5345		
Avg					5110	5360		
6-847-1		1¼X4¼X.250			2200	3775	shear	
-2					2720	2985		
-3					4000	4960		
Avg					2970	3740		
1-811-1		1¼X4⅝X.050	2.0		3075	5305	bearing	
-2					3280	5345		
-3					—	5320		
Avg					3180	5320		
3-831-1		1¼X4⅝X.125			—	5220	shear	
-2					5200	5260		
-3					5250	5360		
Avg					5225	5280		
2-1-1		1¼X4⅝X.160			4540	5445	shear	
-2					4450	5435		
-3					—	5470		
Avg					4495	5450		

CONVAIR — FORT WORTH

TABULATION SHEET TABLE III CONT-RIV 165 RIVETS IN 4130-150 KSI H.T. ALLOY STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
3-861-1	RIV 165-4-12	1 X 4 3/16 X .032	1.5	1/8"	1780	2615	bearing
-2					1710	2575	
-3					1675	2620	
Avg					1720	2600	
3-849-1		1 X 4 3/16 X .036			1615	2110	bearing
-2					1445	2125	
-3					1525	1960	
Avg					1530	2065	
4-871-1		1 X 4 3/16 X .063			2375	2850	shear
-2					2450	3185	
-3					2675	3200	
Avg					2500	3080	
2-829-1		1 X 4 3/16 X .090			2960	3305	shear
-2					2860	3295	
-3					2835	3240	
Avg					2885	3280	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE IV. AN 509 SCREWS IN 7-7 PH, 180 KSI H.T. STAINLESS STEEL.

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT lbs	TYPE OF FAILURE
9-825-1	AN 509-816-22	2 X A 7/8 X .036	1.5	1/2"	8400	9040	shear
-2					4400	5920	
-3					7000	7040	
Avg					6600	7330	
7-837-1		2 X 6 X .050	2.0		10140	11400	bearing
-2					9100	11920	
-3					7350	8520	
Avg					8860	10610	
7-823-1		2 X 6 X .063			4280	8460	shear
-2					3250	12920	
-3					——	8260	
Avg					4035	9880	
7-803-1		2 X 6 X .090			12900	13320	shear
-2					9100	13900	
-3					4800	17880	
Avg					8930	15030	
8-847-1		2 X 6 X .125			9900	13100	shear
-2					12800	24100	
-3					11800	16850	
Avg					11500	18020	
7-869-1	AN 509-616-20	2 X 5 1/2 X .053		3/8"	6700	10920	bearing
-2					6350	9900	
-3					7020	9440	
Avg					6690	10080	
7-853-1		2 X 5 1/2 X .090			9450	15080	tension
-2					10750	14960	
-3					9450	15020	
Avg					9880	15020	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE IV CONT.-AN 509 SCREWS IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
7-849-1	AN 509-616-20	2 X 5½ X .125	2.0	3/8"	9350	13560	shear
-2					8250	12740	
-3					7950	14560	
Avg					8520	13620	
8-811-1		2 X 5 5/16 X .040	1.5		3680	4820	tensile
-2					3230	4995	
-3					2575	4855	
Avg					3160	4890	
9-853-1		2 X 5 5/16 X .063			7450	9380	bearing
-2					6680	9220	
-3					6500	9060	
Avg					6880	9220	
8-869-1	AN 509-516-19	2 X 5 3/32 X .036		5/16"	3400	4425	bearing
-2					3800	4405	
-3					3350	4180	
Avg					3520	4340	
9-841-1		2 X 5 3/32 X .090			2900	7440	tensile
-2					3230	7480	
-3					———	7540	
Avg					3065	7490	
7-873-1		2 X 5¼ X .063	2.0		5510	8840	shear
-2					4620	8200	
-3					4580	9500	
Avg					4900	8845	
7-857-1		2 X 5¼ X .090			9000	10480	shear
-2					8200	9960	
-3					7650	9080	
Avg					8280	9840	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE IV CONT.-AN 509 SCREWS IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE	pg 3
8-871-1	AN 509-416-18	2 X 4 7/8 X .036	1.5	1/4"	2850	3340	bearing	
-2					2275	3145		
Avg					2560	3240		
9-861-1		2 X 4 7/8 X .063			3750	6120	shear	
-2					3640	6100		
-3					3600	6040		
Avg					3660	6090		
9-845-1		2 X 4 7/8 X .090			4600	4660	shear	
-2					5260	6580		
Avg					4930	5620		
7-877-1		2 X 5 X .063	2.0		2420	5940	bearing	
-2					1280	6300		
-3					1150	6120		
Avg					1620	6120		
6-875-1	AN 509-10-17	1 1/2 X 4 3/4 X .032		3/16"	1800	2890	bearing	
-2					2550	2820		
-3					1650	2780		
Avg					2000	2830		
6-863-1		1 1/2 X 4 3/4 X .036			2820	3115	bearing	
-2					——	3190		
-3					2000	3250		
Avg					2410	3185		
1-891-1		1 1/2 X 4 3/4 X .050			3950	5030	bearing	
-2					3340	4940		
-3					3800	5310		
Avg					3700	5090		
7-881-1		1 1/2 X 4 3/4 X .053			2610	3315	shear	
-2					2545	3335		
-3					2300	3100		
Avg					2485	3250		
7-811-1		1 1/2 X 4 3/4 X .090			4680	4790	shear	
-2					——	4835		
-3					4600	5080		
Avg					4640	4900		

CONVAIR — FORT WORTH

TABULATION SHEET TABLE V. NAS 177 RIVETS IN 7-7 PH, 180 KSI H.T STAINLESS STEEL.

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD PSI	ULT. PSI	TYPE OF FAILURE	pg 1
B-821-1	NAS 177-12-8	2 X 5 5/16 X .036	1.5	3/8"	——	5200	bearing	
-2					4050	4930		
-3					4160	4405		
Avg					4105	4845		
B-803-1		2 X 5 5/16 X .050			——	8840	bearing	
-2					7150	8560		
-3					7300	8860		
Avg					7225	8750		
9-827-1		2 X 5 5/16 X .063			7010	11220	bearing	
-2					6470	10660		
-3					6350	10440		
Avg					6610	10775		
9-819-1		2 X 5 5/16 X .071			8070	12820	bearing	
-2					8030	12080		
-3					7150	11800		
Avg					7750	12230		
9-807-1		2 X 5 5/16 X .090			12600	15060	shear	
-2					12050	15120		
-3					12420	13700		
Avg					12360	14630		
6-867-1		2 X 5 1/2 X .032	2.0		4630	4905	bearing	
-2					4200	5355		
-3					4340	5575		
Avg					4390	5280		
6-803-1		2 X 5 1/2 X .036			5120	5600	bearing	
-2					5000	5835		
-3					4720	5465		
Avg					4950	5630		

CONVAIR — FORT WORTH

TABULATION SHEET TABLE V CONT.-NAS 177. RIVETS IN 17-7. PH. 180. KSI HT STAINLESS STEEL.

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT lbs	TYPE OF FAILURE	pg 2
7-817-1	NAS 177-12-8	2 X 5½ X .071	2.0	3/8"	5120	12800	shear	
-2					6160	13260		
-3					5650	12980		
Avg					5640	13010		
7-813-1		2 X 5½ X .080			9750	13020	shear	
-2					9850	13260		
-3					9800	14200		
Avg					9800	13490		
7-805-1		2 X 5½ X .090			11820	14040	shear	
-2					12180	13800		
-3					12000	14000		
Avg					12000	13950		
7-801-1		2 X 5½ X .112			11650	15440	shear	
-2					12640	14820		
-3					12000	14520		
Avg					12010	14920		
8-835-1	NAS 177-10-8	2 X 5 3/32 X .032	1.5	5/16"	3720	3500	bearing	
-2					3060	3470		
-3					3575	3800		
Avg					3450	3590		
8-805-1		2 X 5 3/32 X .050			6040	7460	bearing	
-2					6580	7320		
-3					5420	6940		
Avg					6010	7240		
9-829-1		2 X 5 3/32 X .063			6970	7980	bearing	
-2					6580	8760		
-3					6160	9560		
Avg					6570	8770		

CONVAIR — FORT WORTH

TABULATION SHEET TABLE V CONT-NAS 177 RIVET IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
9-817-1	NAS 177-10-8	2 X 5 3/32 X .080	1.5	5/16"	9210	10400	shear
-2					9040	10800	
Avg					9125	10600	
9-809-1		2 X 5 3/32 X .090			4660	7520	tensile
-2					4600	7120	
-3					2480	7340	
Avg					3910	7330	
6-1-1		2 X 5 1/4 X .040	2.0		3160	4720	bearing
-2					3370	4860	
-3					2550	4840	
Avg					3030	4810	
7-841-1		2 X 5 1/4 X .050			5340	7020	bearing
-2					4400	7520	
-3					4730	7420	
Avg					4820	7320	
7-815-1		2 X 5 1/4 X .080			7430	12600	shear
-2					7260	11780	
-3					7630	12480	
Avg					7440	12285	
7-807-1		2 X 5 1/4 X .090			8400	11200	tensile
-2					8620	10960	
-3					8950	10500	
Avg					8660	10890	
8-825-1	NAS 177-8-8	2 X 4 7/8 X .036	1.5	1/4"	3330	3445	bearing
-2					2270	3355	
Avg					1870	3400	
8-815-1		2 X 4 7/8 X .040			2350	3990	bearing
-2					2500	4390	
-3					2350	4160	
Avg					2400	4180	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE V CONT: NAS 177 RIVETS IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL

SPECIMEN NO.	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT lbs	TYPE OF FAILURE	PG 4
9-831-1	NAS177-8-8	2X4 1/8 X.063	1.5	1/4"	4440	6040	shear	
-2					4250	8620		
-3					4630	5980		
Avg					4440	6880		
9-811-1		2X4 1/8 X.090			6480	7520	shear	
-2					6150	7100		
-3					—	7020		
Avg					6315	7210		
6-819-1		2X5 X.032	2.0		850	3230	bearing	
-2					1380	3440		
Avg					—	3335		
6-807-1		2X5 X.036			2470	5380	shear	
-2					2830	5400		
Avg					2800	5390		
6-3-1		2X5 X.040				5125	bearing	
7-843-1		2X5 X.050			1850	6760	shear	
-2					2880	6200		
-3					2050	6480		
Avg					2260	6480		
7-829-1		2X5 X.063			6250	10780	shear	
-2					7410	9260		
Avg					6830	10020		
7-809-1		2X5 X.090			5680	6980	shear	
-2					5460	7300		
-3					—	6880		
Avg					5570	7050		

CONVAIR — FORT WORTH

TABULATION SHEET TABLE V CONT.-NAS 177 RIVET IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE	Pg 5
B-809-1	NAS177-6-8	1½X4 9/32 X.050	1.5	3/16"	—	3325	shear	
-2					3250	3810		
-3					3310	3790		
Avg					3280	3640		
B-843-1	NAS 177-4-8	1 X4 7/16 X.032		1/8"	1085	1500	shear	
-2					1825	2430		
-3					2015	2555		
Avg					1640	2160		
B-831-1		1X4 7/16 X.036			1165	1985	shear	
-2					1220	1715		
-3					1360	1960		
Avg					1248	1885		
B-5-1		1X4 7/16 X.063			1785	2010	shear	
-2					1860	2120		
-3					1800	2020		
Avg					1815	2050		
6-827-1		1X4½X.025	2.0		—	1625	bearing	
-2					—	1680		
Avg						1650		
6-825-1		1X4½X.032			1360	2440	bearing	
-2					1580	2240		
Avg					1470	2340		
6-865-1		1X4½X.036			2125	2820	shear	
-2					2100	2700		
Avg					2110	2760		
7-835-1		1X4½X.063			1950	2160	shear	
-2					1725	2150		
-3					1840	2150		
Avg					1840	2155		

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CONVAIR — FORT WORTH

TABULATION SHEET TABLE VI-RIV 165 RIVETS IN 17 7 PH, 180 KSI H.T. STAINLESS STEEL.

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE	pg 1
B-879-1	RIV 165-12-12	2X5 5/16 X.032	1.5	3/8"	8520	11300	tensile	
-2					9120	11300		
-3					9200	11440		
Avg					8950	11350		
9-849-1		2X5 5/16 X.071			11200	14860	tensile	
-2					12000	15000		
-3					11400	14800		
Avg					11530	14890		
9-847-1		2X5 5/16 X.080			14200	17820	tensile	
-2					14000	17560		
-3					14620	17540		
Avg					14270	17640		
9-803-1		2X5 5/16 X.112			21400	25000	tensile	
-2					19500	25250		
-3					——	25500		
Avg					20450	25250		
9-3-1		2X5 5/16 X.125			9600	24600	tensile	
-2					11000	25400		
-3					——	24350		
Avg					10300	24780		
7-865-1		2X5 1/2 X.071	2.0		——	15320	tensile	
-2					8100	15680		
-3					7650	14540		
Avg					7875	15180		
7-863-1		2X5 1/2 X.080			——	16000	tensile	
-2					12480	15480		
Avg					12480	15740		

CONVAIR — FORT WORTH

TABULATION SHEET TABLE VI CONT.-RIV 165 RIVET IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL.

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST	YIELD lbs	ULT. lbs	TYPE OF FAILURE
7-851-1	RIV 165-12-12	2 X 5½ X .090	2.0	3/16"	15900	21020	tensile
-2					14450	21000	
-3					12200	21600	
Avg					14180	21200	
7-1-1		2 X 5½ X .125			21400	26750	tensile
-2					23200	26550	
-3					20500	27550	
Avg					21700	26950	
8-881-1	RIV 165-10-12	2 X 5 3/32 X .032	1.5	5/16"	3870	4180	bearing
-2					4100	4905	
-3					4300	4770	
Avg					4090	4420	
8-813-1		2 X 5 3/32 X .040			5200	5345	bearing
-2					4410	4950	
-3					4430	4875	
Avg					4680	5060	
8-855-1		2 X 5 3/32 X .050			5920	7640	bearing
-2					——	7960	
-3					5930	7840	
Avg					5925	7810	
9-855-1		2 X 5 3/32 X .063			6200	11460	bearing
-2					7800	11600	
-3					5750	10720	
Avg					6580	11260	
9-839-1		2 X 5 3/32 X .090			4700	8220	shear
-2					4380	8300	
-3					4500	8400	
Avg					4530	8305	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE VI CONT-RIV 165 RIV. TS IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
9-5-1	RIV 165-10-12	2 X 5 3/32 X .125	1.5	5/16"	14650	18940	shear
-2					——	19100	
Avg					14650	19020	
6-869-1		2 X 5 1/4 X .032	2.0		3700	4170	bearing
-2					——	4470	
-3					2860	4225	
Avg					3280	4290	
6-849-1		2 X 5 1/4 X .040			4330	6200	bearing
-2					4760	6260	
Avg					4545	6230	
7-885-1		2 X 5 1/4 X .050			——	8680	bearing
-2					6060	8520	
-3					6700	8780	
Avg					6380	8660	
7-827-1		2 X 5 1/4 X .063			3600	10720	shear
-2					3850	10600	
-3					6900	10220	
Avg					4780	10515	
7-867-1		2 X 5 1/4 X .071			4500	11300	bearing
-2					5900	11420	
-3					8800	13060	
Avg					6400	11925	
7-855-1		2 X 5 1/4 X .090			13550	18900	shear
-2					10200	18800	
-3					14950	18240	
Avg					12900	18650	
7-9 1		2 X 5 1/4 X .125			12750	12900	shear
2					12450	13080	
-3					13000	13540	
Avg					12730	13170	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE VI CONT.-RIV 165 RIVETS IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT lbs	TYPE OF FAILURE
8-883-1	RIV 165-8-12	2X4 1/8 X.032	1.5	1/4"	3450	3925	bearing
-2					—	3725	
Avg					3450	3825	
8-857-1		2X4 1/8 X.050			6600	6940	bearing
-2					5030	6360	
-3					5040	7000	
Avg					5560	6770	
9-823-1		2X4 1/8 X.071			5600	9660	bearing
-2					—	9760	
-3					—	10000	
Avg					5600	9807	
9-843-1		2X4 1/8 X.090			4160	6040	tensile
-2					4300	7240	
-3					5250	7240	
Avg					4570	6840	
9-801-1		2X4 1/8 X.125			11400	13050	shear
-2					10850	12540	
Avg					11010	12795	
6-871-1		2X 5 X.032	2.0		—	3675	bearing
-2					2160	3315	
-3					1430	3385	
Avg					1795	3460	
6-851-1		2 X 5 X.040			—	5180	bearing
-2					—	5160	
Avg					—	5170	
7-887-1		2 X 5 X.050			—	8420	bearing
-2					4160	8350	
-3					—	7920	
Avg					4160	8230	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE VI CONT.- RIV 165 RIVET IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE
7-875-1	RIV 165-8-12	2 X 5 X .063	2.0	1/4"	7600	11060	bearing
-2					5500	11220	"
-3					5480	11040	shear
Avg					6190	11110	
7-859-1		2 X 5 X .090			5580	12460	shear
-2					8700	12140	
-3					7760	12440	
Avg					7350	12350	
7-5-1		2 X 5 X .125			9400	13080	shear
-2					9600	13220	
-3					9880	13120	
Avg					9630	13140	
9-813-1	RIV 165-6-12	1½ X 4 9/32 X .090	1.5	3/16"	6250	7300	shear
-2					5990	7450	
-3					5310	7320	
Avg					5850	7360	
6-873-1		1½ X 4 3/4 X .032	2.0		1570	3120	bearing
6-853-1		1½ X 4 3/4 X .040			2050	3770	bearing
-2					2050	3410	"
-3					1950	3635	shear
Avg					2020	3605	
7-889-1		1½ X 4 3/4 X .050			4410	6400	bearing
8-829-1	RIV 165-5-12	1¼ X 4 5/8 X .036	1.5	5/32	2780	3390	bearing
-2					2350	3190	
-3					2700	3445	
Avg					2610	3340	

CONVAIR — FORT WORTH

TABULATION SHEET TABLE VI CONT.-RIV 165 RIVETS IN 17-7 PH, 180 KSI H.T. STAINLESS STEEL

SPECIMEN NO	TYPE OF FASTENER	SIZE OF PLATES	E/D RATIO	DIA. OF FAST.	YIELD lbs	ULT. lbs	TYPE OF FAILURE			pg 6
B-823-1	RIV 165-5-12	1¼ X 4 5/8 X .032	2.0	5/32	3460	3990	bearing			
-2					3230	3645				
-3					3270	3950				
Avg.					3320	3390				
B-877-1	RIV 165-4-12	1¼ X 4 3/16 X .036	1.5	1/8"	1320	2080	shear			
-2					1590	2250				
-3					1565	2280				
Avg					1490	2205				
B-853-1		1¼ X 4 3/16 X .063			2400	3135	shear			
-2					2360	3125				
-3					——	3010				
Avg					2380	3090				

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